



Service Manual

30C, 45C

Load Push and Load Push/Pull

Serial Numbers 673290 through 679295

Manual Number 674219 R-1

cascade®

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1 Introduction

This manual provides the installation instructions, periodic maintenance requirements, troubleshooting procedures and service guides, for 30C and 45C Load Push and Load Push/Pulls. Note that all specifications are shown in US and (Metric) units where applicable.

1.1

Special Instruction Definitions

▲ WARNING

A statement preceded by **▲ WARNING** is information that should be acted upon to prevent **bodily injury**. A **WARNING** is always inside a ruled box.

CAUTION

A statement preceded by **CAUTION** is information that should be acted upon to prevent **Machine Damage**.

IMPORTANT

A statement preceded by **IMPORTANT** is information that possesses special significance.

NOTE

A statement preceded by **NOTE** is information that is handy to know and may make your job easier.

Section

2 Installation Instructions



WARNING: Rated capacity of the truck/attachment combination is a responsibility of the original truck manufacturer and may be less than that shown on the attachment nameplate. Consult the truck nameplate.

2.1

Truck Requirements

- Truck Relief Valve Setting: 2000 psi recommended. 2300 psi maximum.
- Hydraulic flow should fall within the volume range shown in the table.
- The truck hydraulic system must supply oil to the attachment that meets the specifications shown in the table.
- Recommended hose and fitting size:
No. 6 with minimum fitting orifices of 9/32 in. (7mm).
- Truck carriage must conform to ISO dimensional standard 2328, equivalent to Industrial Truck Association (ITA) dimensions shown in Section 6.1-2.
- Make sure the truck carriage is clean and the notches are undamaged.
- In order to conform to industry standard practice, the hoses should be connected to the truck auxiliary valve as indicated by the chart in Section 6.1-1.

Hydraulic Specifications	30C	45C
Pressure – Recommended	2000 (140 bar)	2000 (140 bar)
Maximum	2300 (160 bar)	2300 (160 bar)
Flow – Minimum^①	3 GPM (11L/min)	3 GPM (11L/min)
Recommended	9 GPM (34L/min)	6 GPM (22L/min)
Maximum^②	15 GPM (56L/min)	10 GPM (37L/min)
Supply Hose and Fitting Size Minimum Orifice Size	No. 6 9/32in. (7mm)	No. 6 9/32in. (7mm)
① Flow less than minimum will result in slow faceplate speed. ② Flow greater than maximum can result in excessive faceplate speed, reduced system performance and short hydraulic system life. Hydraulic Oil – Cascade attachments are compatible with SAE 10W petroleum base oil per Mil. Spec. MIL-O-5606 or MIL-O-2104B. Use of synthetic or aqueous base hydraulic oil is not recommended. Contact Cascade if fire resistant hydraulic oil must be used.		

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2.2

Installation Non-Sideshifting

NOTE: Sideshifting Load Push and Load Push/Pull Installation begins with section 2.3



WARNING: Rated capacity of the truck/attachment combination is a responsibility of the original truck manufacturer and may be less than shown on the attachment nameplate. Consult the truck nameplate.

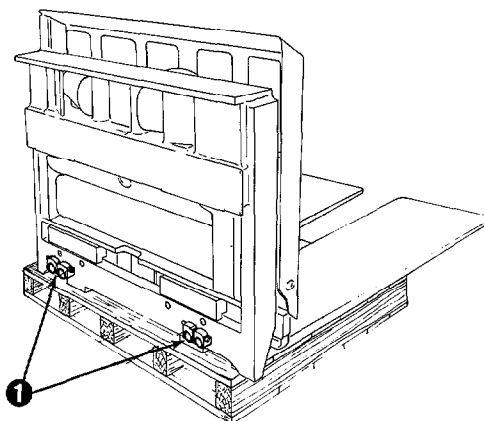
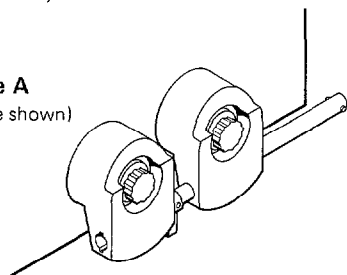
2.2-1

Prior to Installation

- 1 Install the **Quick Change** lower mounting hooks. For Bolt-On type hooks, proceed to Section 2.2-2.

Quick Change Type A– Install the components as shown. Tighten the capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

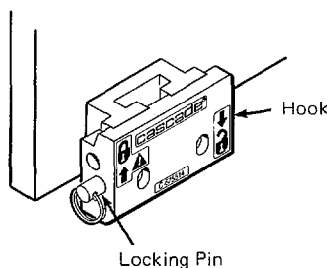
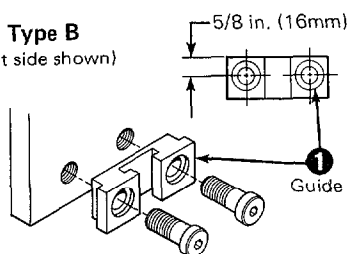
Type A
(Right side shown)



Quick Change Type B–

- a. Install the guides to the baseplate mounting holes with the guide hole offset in the upward position— 5/8 in. (16mm) from top of guide to hole center. Tighten the capscrews to a torque of 105–115 ft.-lbs.
- b. Slide the hooks over the top of the guides. Install each locking pin through the hook lower hole.

Type B
(left side shown)



Section 2 Installation Instructions

2.2-2 Installation

REVERSING THE PUSH/PULL PORTS

Units equipped with a flow control manifold have the option of turning the manifold over to reverse the location of the Push/Pull ports. This will accommodate trucks already plumbed with Push/Pull supply hoses on the left side of the truck. See Section 5.3-9.

- 1 Center the lift truck behind the attachment. Tilt the mast forward. Engage the upper hook locating tab with the closest upper carriage bar notch and raise the truck carriage into position behind the attachment. Lift the attachment 2 in. (5cm) off the pallet.

NOTE: The attachment may not be perfectly centered on the carriage bar when the locating tab is engaged in the upper carriage bar notch.



WARNING: The upper mounting hook must be properly engaged with the upper carriage bar. The locating tab must be engaged in the mating notch on the upper carriage bar.

NOTE: The lower hooks cannot be properly installed if the locating tab is not engaged in the carriage notch.

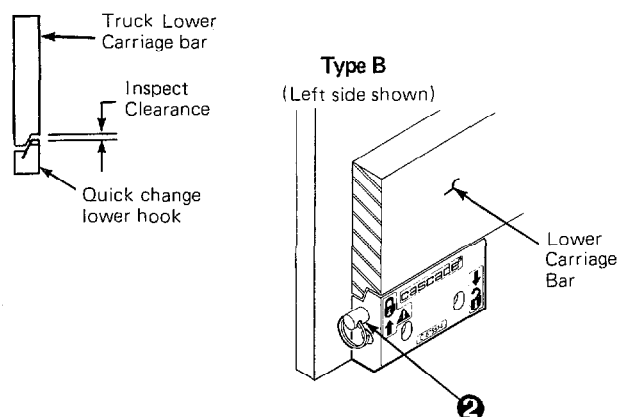
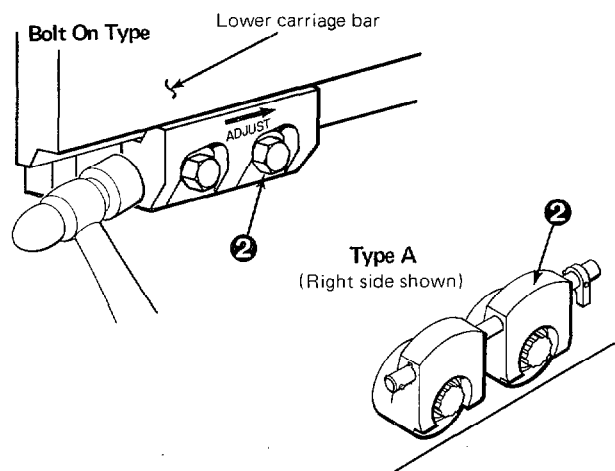
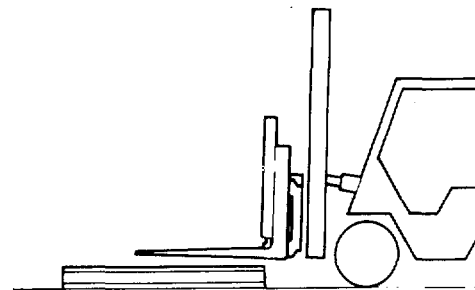
- 2 Engage the lower hooks with the truck lower carriage bar.

Bolt On Type—Install the hooks and capscrews. Tighten the capscrews finger tight. Tap the end of the hooks with a hammer in the direction of the adjust arrow for **maximum** engagement with the carriage bar. Tighten the capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

Quick Change Type A – Turn both hooks up and reinstall the pin. The maximum allowable clearance between the hooks and carriage bar is 1/8 in. (4mm) as shown.

Quick Change Type B – Remove the locking pins. Slide the hooks up to engage with the carriage bar. Install the locking pins through the upper holes.

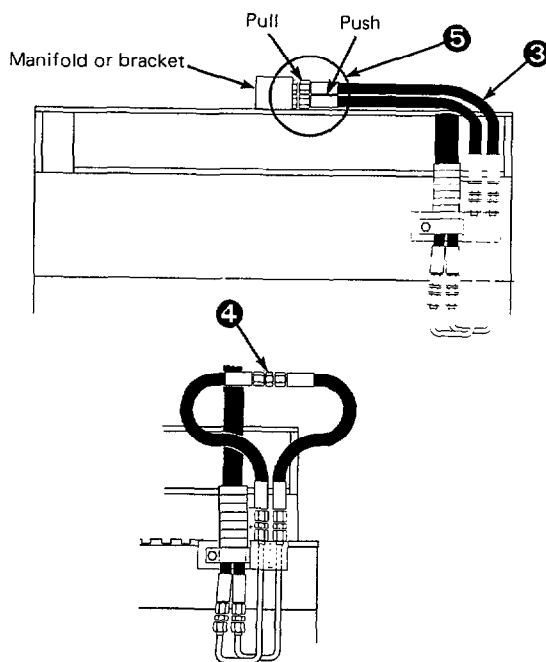
CAUTION: If the clearance between the carriage bar and the hooks exceeds 3/16 in. (6mm), the guides (refer to Section 2.2-1, step 1) should be inverted and installed with the hole offset downward (5/8 in./16mm from bottom of guide to hole center) to minimize the gap.



Section 2 Installation Instructions

2.2-2 Installation (Continued)

- ③ Measure the hydraulic hose length required to connect the hoses to the hose terminal. Remove the hoses and cut to length as required.
CAUTION: Flush the hoses as follows to prevent damage to the attachment hydraulic components.
- ④ Connect the hoses to the truck hose terminal. Connect the hoses together using a union fitting. Start the truck and actuate the truck control valve in both directions for about 30 seconds to carry any debris in the hoses to the truck hydraulic tank and filter.
- ⑤ Remove the union fitting and connect the hoses to the attachment fittings as shown.



2.2-3 Prior to Operation

Remove air from the system by extending the faceplate fully, and keeping it there for 10–20 seconds with the control valve actuated.

NOTE: This should correct an irregularly extending faceplate. If it does not, retract the faceplate and repeat the process a second time.

Operate the unit through several complete cycles and make sure all functions operate smoothly and correctly.

PUSH/PULL UNITS:

- The gripper jaw should open prior to the faceplate extension when the control handle is pushed forward.
- The gripper jaw should close completely prior to faceplate retraction when the control handle is pulled back.

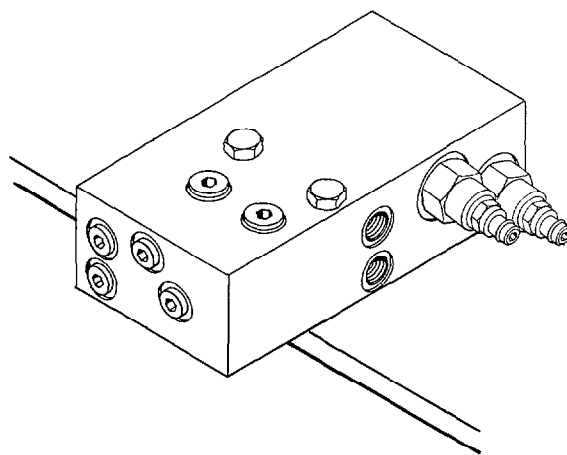
PUSH/PULL UNITS with FLOW CONTROL MANIFOLD:

• **SPEED ADJUSTMENT**

The flow control manifold has a separate speed adjustment range of $\pm 30\%$ for the load push and load pull functions. See Section 5.3-10 for adjustment procedures.

• **HIGH VOLUME BY-PASS ADJUSTMENT**

The flow control manifold has an adjustable by-pass orifice for use with high volume truck applications. The by-pass should be adjusted open for high volume trucks to reduce engine stall during actuation of the attachment. See Section 5.3-8 for adjustment procedures.



FLOW CONTROL MANIFOLD

2 Installation Instructions

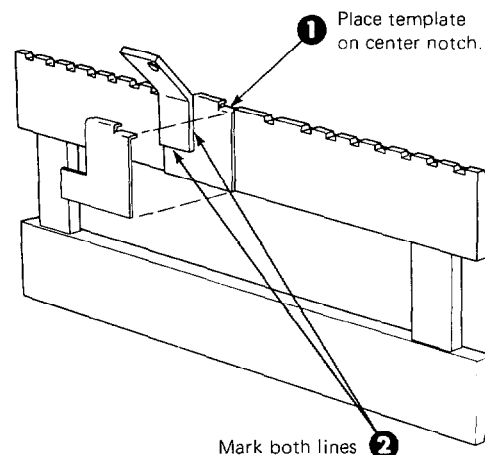
2.3 Installation-Sideshifting

2.3-1 Prior to Installation

Skip Steps 1 through 4 if the unit is equipped with Quick Disconnect mounting hooks.

TO ATTACH THE SIDESHIFT CYLINDER ANCHOR BRACKET:

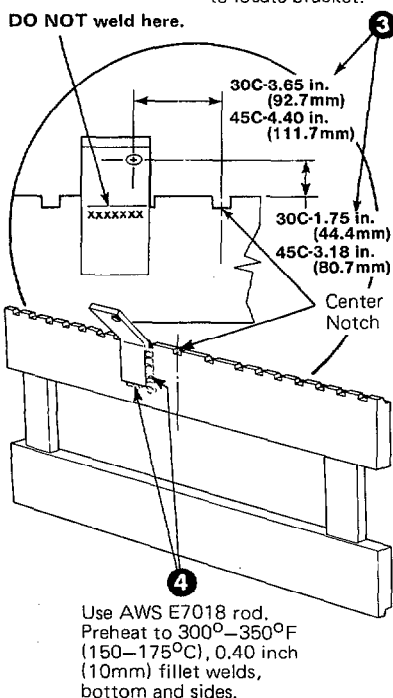
- ① Position the cardboard template* in the center notch of the truck carriage.
- ② Mark the two lines shown and remove the template.
- * ③ If the template is not available use the dimensions shown to locate the bracket. Template part no.'s are listed below.
- ④ Position the cylinder anchor bracket on the marks and weld the bracket in place using AWS E7018 rod. Preheat to 300°–350°F. (150–175°C.), and weld the bottom and sides of the bracket with a 0.40 inch (10mm) fillet weld.



All Class II models except Sheet Sav®

TEMPLATE 667382

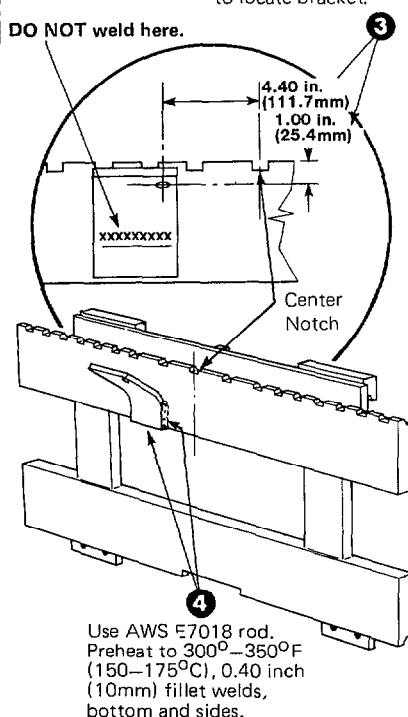
If template is missing, use these dimensions to locate bracket.



All Class III models

TEMPLATE 671174

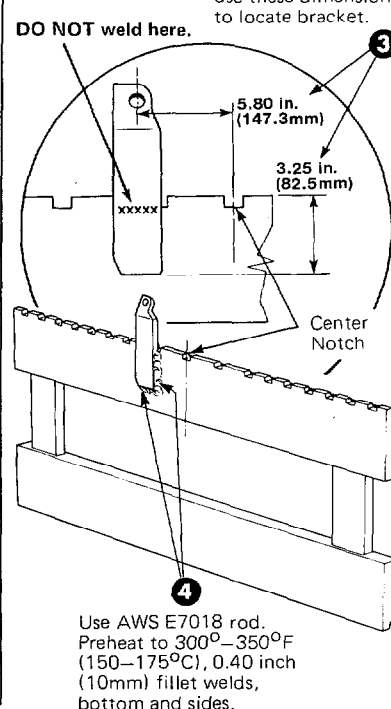
If template is missing, use these dimensions to locate bracket.



Sheet Sav®

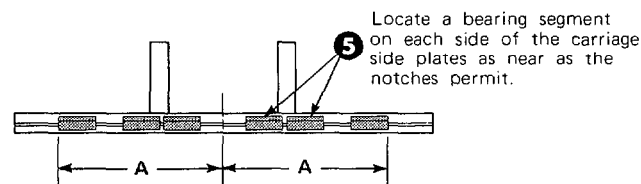
TEMPLATE 673253

If template is missing, use these dimensions to locate bracket.



ALL UNITS PERFORM THE FOLLOWING:

- ⑤ Place the sideshifting bearing segments in the notches of the truck carriage as shown. Apply a liberal coating of graphite base grease to the bearing segments.



32 in. (812mm) carriage: A = 14 in. (355mm) MIN.
16 in. (406mm) MAX.

36 in. (914mm) carriage: A = 14 in. (355mm) MIN.
17 in. (431mm) MAX.

Section 2 Installation Instructions

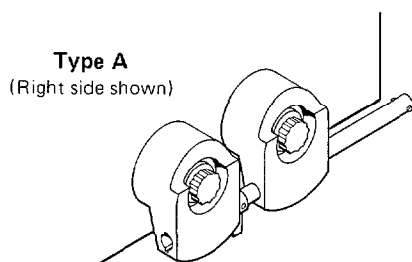
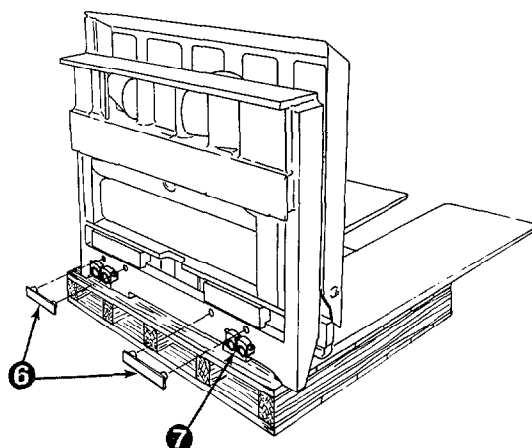
2.3-1 Prior To Installation (Cont.)

- ⑥ Install the two lower bearing strips on the attachment and coat them with a graphite base grease.
- ⑦ Install the **Quick Change** lower mounting hooks. For attachments with bolt-on type hooks, proceed to step 8.

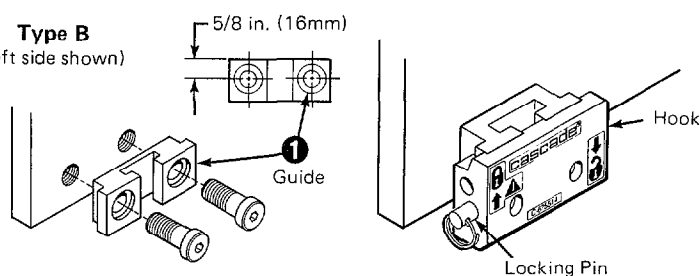
Quick Change Type A– Install the components as shown. Tighten the capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

Quick Change Type B–

- a. Install the guides to the baseplate mounting holes with the guide hole offset in the upward position– 5/8 in. (16mm) from top of guide to hole center. Tighten the capscrews to a torque of 105–115 ft.-lbs.
- b. Slide the hooks over the top of the guides. Install each locking pin through the hook lower hole.



Type B
(Left side shown)



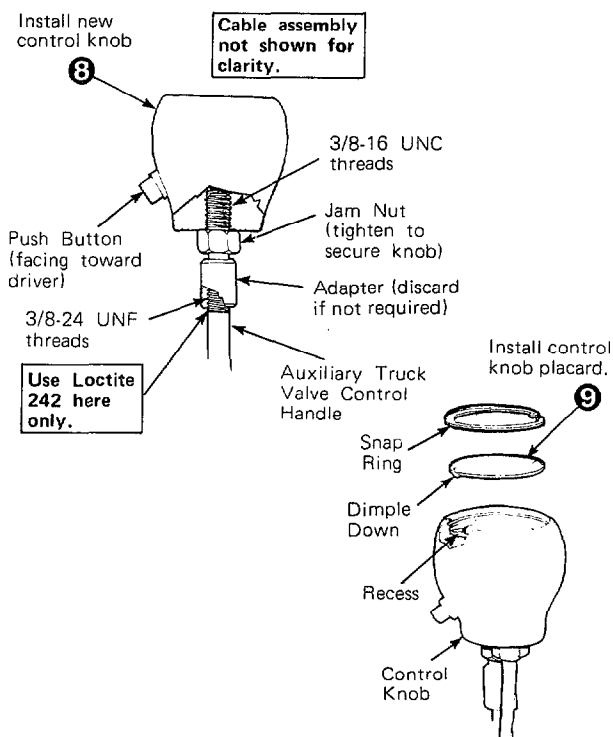
TO INSTALL THE CONTROL KNOB (Solenoid Units Only):

- ⑧ Remove the existing knob from the auxiliary valve control handle and install the new knob as shown. If the control handle is not threaded, weld on the adapter supplied with the new knob.

NOTE: It may be necessary to saw off a portion of the control handle to achieve a comfortable length.

CAUTION: Secure the cable assembly to the control handle so the cable will not be pinched at the truck cow when the handle is actuated.

- ⑨ If the control knob has 1 button, then the two-function side of the control knob placard should be showing. When the control knob has 2 buttons, then the three-function side of the placard should be showing. Fit the dimple on the placard into the recess on the knob and install the snap ring.



2 Installation Instructions

2.3-2 Installation

- 1 Center the lift truck behind the attachment. Tilt the mast forward. Engage the attachment upper hook centering tab with the closest truck upper carriage bar notch and raise the truck carriage into position behind the attachment. Lift the attachment 2 in. (5cm) off the pallet.

NOTE: The attachment may not be perfectly centered on the carriage bar when the centering tab is engaged in the upper carriage bar notch.



WARNING: The upper mounting hook must be properly engaged with the upper carriage bar. The centering tab must be engaged in the mating notch on the upper carriage bar.

NOTE: The lower hooks cannot be properly installed if the locating tab is not engaged in the carriage notch.

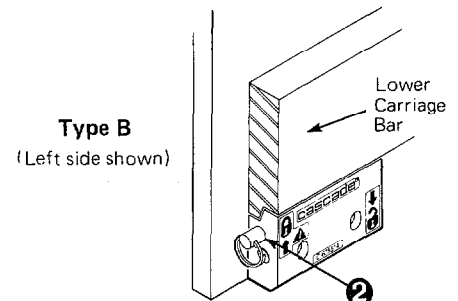
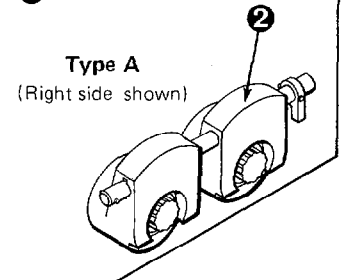
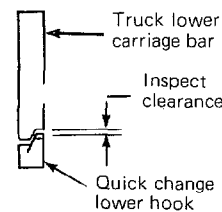
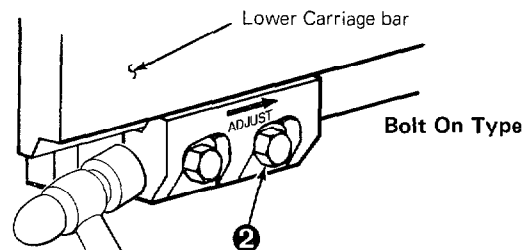
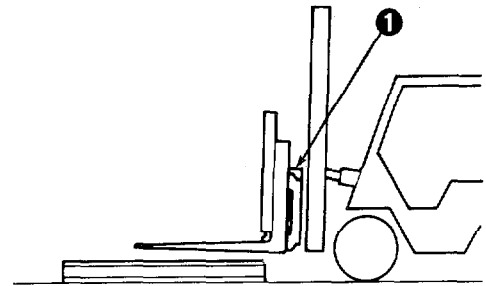
- 2 Engage the lower hooks with the truck lower carriage bar.

Bolt On Type—Install the hooks and capscrews. Tighten the capscrews finger tight. Tap the end of the hooks with a hammer in the direction of the adjust arrow for **maximum** engagement with the carriage bar. Tighten the capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

Quick Change Type A—Turn both hooks up and reinstall the pin. The maximum allowable clearance between the hooks and carriage bar is 1/8 in. (4mm) as shown.

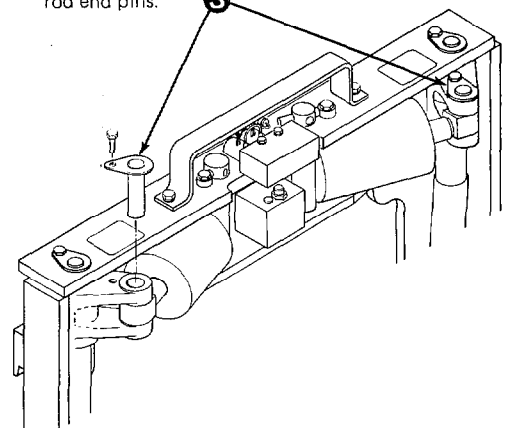
Quick Change Type B—Remove the locking pins. Slide the hooks up to engage with the carriage bar. Install the locking pins through the upper holes.

CAUTION: If the clearance between the carriage bar and the hooks exceeds 3/16 in. (6mm), the guides (refer to Section 2.2-1, step 1) should be inverted and installed with the hole offset downward (5/8 in./16mm from bottom of guide to hole center) to minimize the gap.



- 3 Remove the push/pull cylinder rod end pins. Manually pull the faceplate away from the frame.

Remove cylinder rod end pins.



2 Installation Instructions

2.3-2 Installation (Cont.)

- 4 Install the sideshift cylinder rod to the anchor bracket. Push the faceplate back against the frame and reinstall the push/pull cylinder rod end pins.

Reversing the Sideshift and Push/Pull ports (Flow Control Manifold equipped units only).

Units equipped with a flow control manifold have the option of turning the manifold over to reverse the location of the Push/Pull and Sideshift ports. This will accommodate trucks already plumbed with Push/Pull supply hoses on the left side and Sideshift supply hoses on the right side of the truck. See Section 5.3-9.

- 5 Position the attachment 4 in./10cm (4 in./10cm = ½ sideshift cylinder stroke) to one side of center.

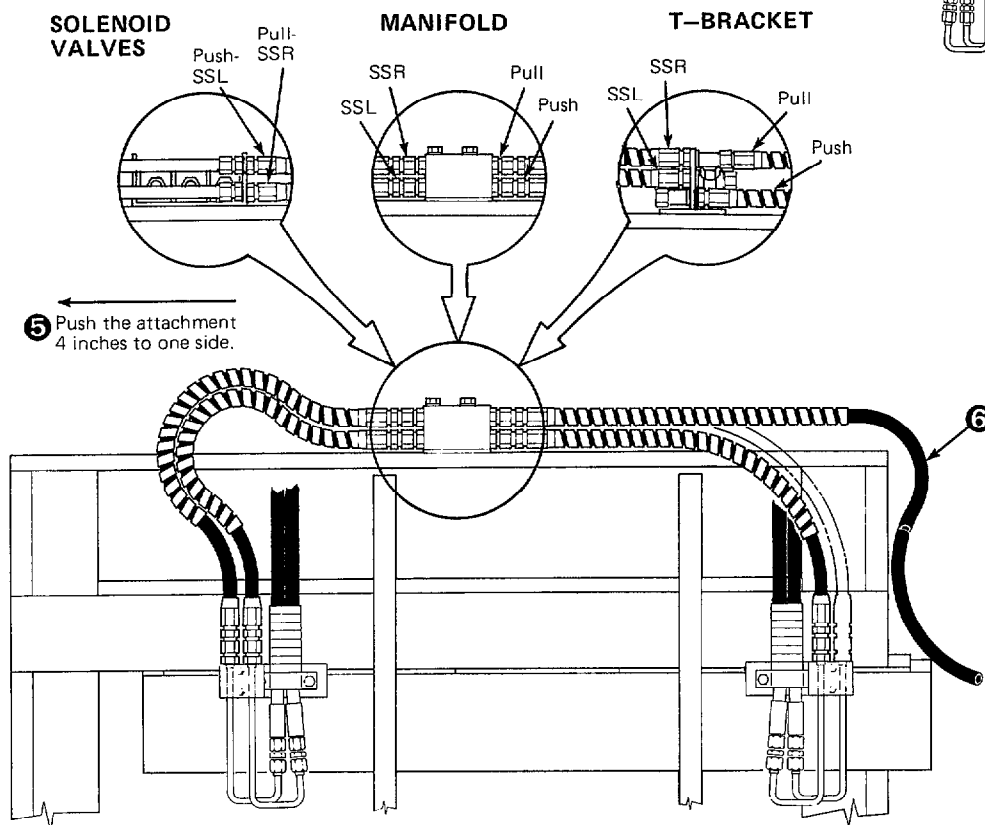
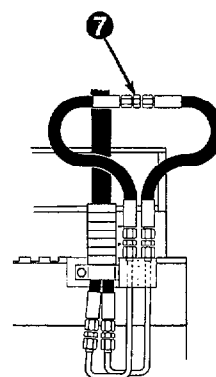
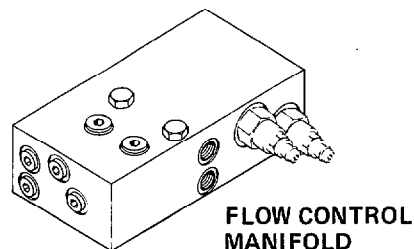
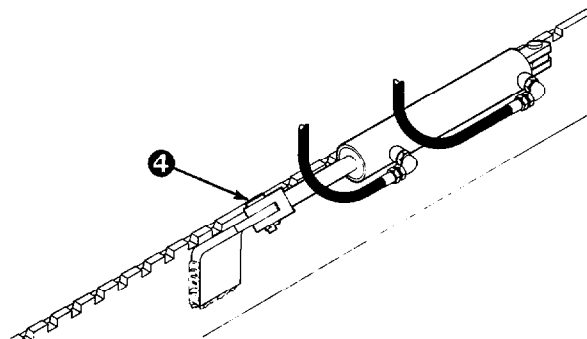
NOTE: Open both fittings on the sideshift cylinder to allow the rod to move easily.

- 6 Measure the hydraulic hose length required to connect the hoses to the hose terminal. Remove the hoses and cut to length as required.

CAUTION: Flush the hoses as follows to prevent damage to the attachment hydraulic components.

- 7 Connect the hoses to the truck hose terminal. Connect the hoses together using a union fitting. Start the truck and actuate the truck control valve in both directions for about 30 seconds to carry any debris in the hoses to the truck hydraulic tank and filter.

- 8 Remove the union fittings and connect the hoses to the attachment fittings as shown. Position the hose guards to prevent the hoses from being scuffed by the frame.



Section

2.3-2

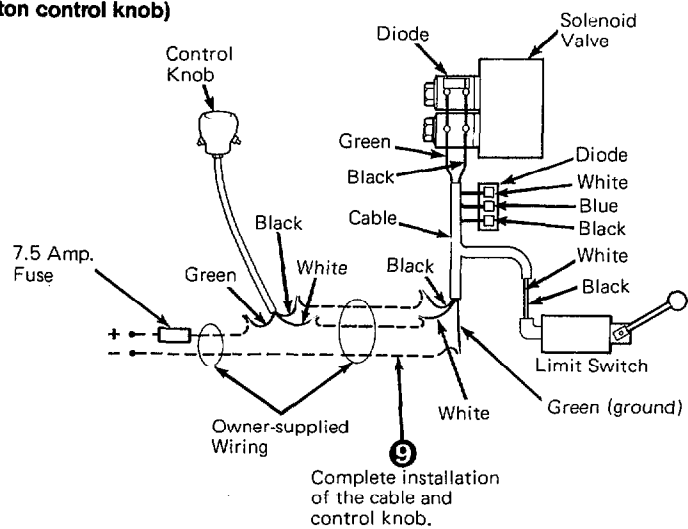
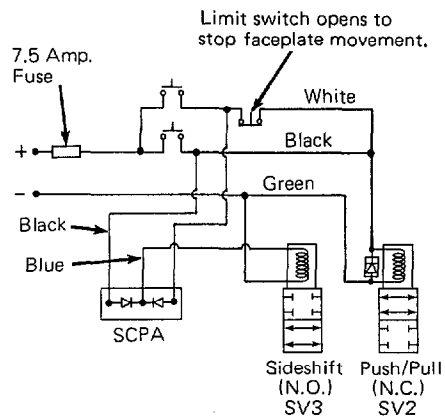
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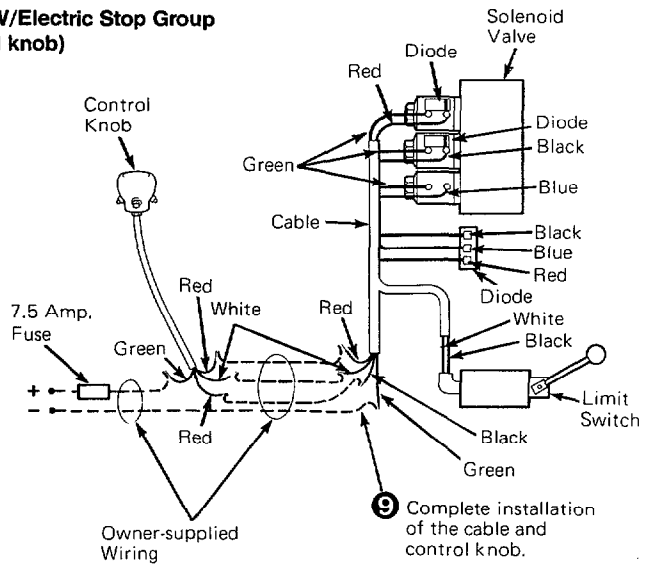
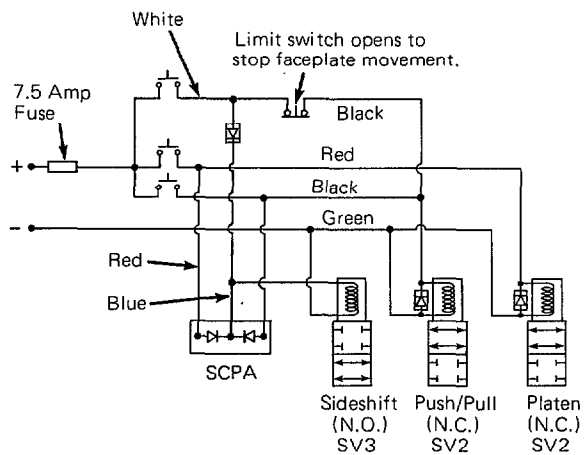
Section 2 Installation Instructions

2.3-2 Installation (Cont.)

**TWO-FUNCTION W/Electric Stop Group
(Two button control knob)**



**THREE-FUNCTION W/Electric Stop Group
(Three button control knob)**



Section 2 Installation Instructions

2.3-3 Prior to Operation

Remove air from the system by extending the faceplate fully, and keeping it there for 10–20 seconds with the control valve actuated. Sideshift the attachment several times to force air from the sideshift cylinder to the truck reservoir.

NOTE: This should correct an irregularly extending faceplate. If it does not, retract the faceplate and repeat the process.

Operate the unit through several complete cycles and make sure all functions operate smoothly and correctly.

PUSH/PULL UNITS:

- The gripper jaw should open prior to the faceplate extension when the control handle is pushed forward.
- The gripper jaw should close completely prior to faceplate retraction when the control handle is pulled back.

PUSH/PULL UNITS WITH FLOW CONTROL MANIFOLD OR SOLENOID VALVE:

• SPEED ADJUSTMENT

The flow control manifold and solenoid valve have a separate speed adjustment range of $\pm 30\%$ for the load push and load pull functions. See Section 5.3-10 for adjustment procedures.

• HIGH VOLUME BYPASS ADJUSTMENT

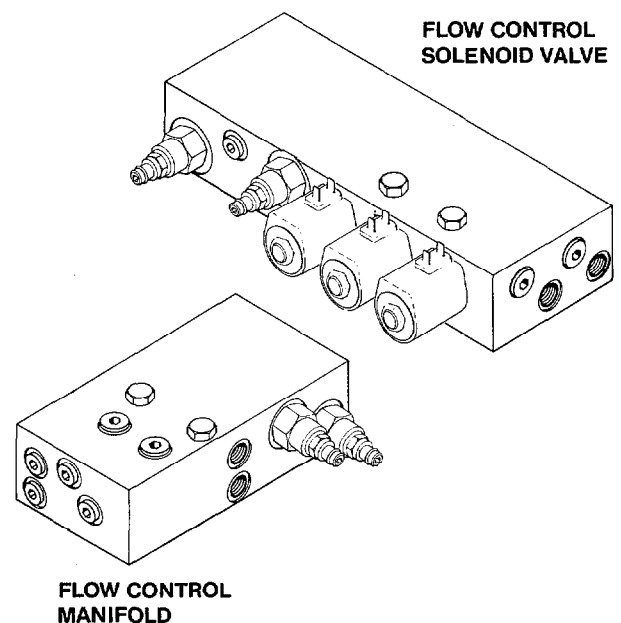
The flow control manifold and solenoid valve have a bypass orifice for use with high volume truck applications. The bypass should be adjusted open for high volume trucks to reduce engine stall during actuation of the attachment. See Section 5.3-8 for adjustment procedures.

PUSH/PULL UNITS WITH MANUAL OR ELECTRIC STOP GROUPS:

The optional faceplate stop groups control the amount of faceplate retraction to prevent the platens from extending beyond the end of the unit load being carried, and possibly damaging adjacent loads already stacked. To adjust a manual or electric stop group, See Section 5.6 or 5.7.

PUSH/PULL UNITS WITH ADJUSTABLE PLATENS

The platens can be adjusted to a wider or narrower profile without tools to accommodate different size loads or for pallet handling. See Section 5.5-1 for adjustment procedures.



3.1

100 Hour Maintenance

Every time the lift truck is serviced or every 100 hours of truck operation, whichever comes first, complete the following maintenance procedures:

- ☐ Inspect the platen shims at the bottom of the frame. Tighten the bolts and readjust the shims as shown in Section 5.5, if necessary.
- ☐ Inspect the faceplate rollers and related parts for sufficient lubrication. If necessary, lubricate with Dubois FGG-2 food industry grease, Cascade Part No. 669306.
- ☐ Inspect the hoses mounted in the pantograph arms. They should be mounted securely and without hose droop. Check for hose wear and kinking at the primary and secondary arm connections. Replace kinked or worn hoses.

IMPORTANT

After completing any service procedure, always test each function through 5 complete cycles. First test the clamp empty to bleed excess air trapped in the system. Then test each function with a load to make sure the attachment operates correctly before returning it to the job.

3.2

500 Hour Maintenance

After each 500 hours of lift truck operation, in addition to the 100-hour maintenance procedure, perform the following:

- ☐ Inspect all bearings and shims at the pivot points for excessive wear. Replace if necessary.
- ☐ Tighten the capscrews that secure the arm pivot pins to a torque of 14–16 ft.-lb. (19–22 N·m).
- ☐ Lubricate the faceplate rollers and guides with Dubois FGG-2 food industry grease, Cascade Part No. 669306.
- ☐ Inspect the bolts securing the gripper pad. Tighten if necessary.



WARNING: Tighten the platen hook capscrews to a torque of 200–210 ft.-lbs. (270–285 N·m).

- ☐ Tighten the lower mounting hook capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

3.3

1000 Hour Maintenance

After each 1000 hours of lift truck operation, in addition to the 100-hour and 500-hour maintenance procedures, perform the following.

- ☐ Check the sideshift bearing strips and segments for excessive wear. Replace if necessary. Keep the bearing strips and segments well lubricated with Dubois FGG-2 food industry grease, Cascade Part No. 669306.
- ☐ On sheet retainer models check the carrier assembly bearing segments for excessive wear. Replace if necessary. Keep the bearing strips and segments well lubricated with Dubois FGG-2 food industry grease, Cascade Part No. 669306.

3.4

2000 Hour Maintenance

After each 2000 hours of lift truck operation, in addition to the 100-hour, 500-hour, and 1000-hour maintenance procedures, perform the following procedure.

- ☐ Replace all arm bushings and thrust washers.

4.1

General Procedures



WARNING: Before servicing any hydraulic component, relieve pressure in the system. Extend the faceplate 18 to 24 in. (46–61 cm), turn the truck off, and open the truck auxiliary valves several times in both directions.

After completing any service procedure, always test the function through several cycles. First test the attachment empty to bleed air trapped in the system to the truck tank. Then test the attachment with a load to be sure it operates correctly before returning it to the job.

Stay clear of the load while testing. Do not raise the load more than 3 in. (75mm) off floor while testing.

Hydraulic Specifications	30C	45C
Pressure – Recommended	2000 (140 bar)	2000 (140 bar)
Maximum	2300 (160 bar)	2300 (160 bar)
Flow – Minimum^①	3 GPM (11L/min)	3 GPM (11L/min)
Recommended	9 GPM (34L/min)	6 GPM (22L/min)
Maximum^②	15 GPM (56L/min)	10 GPM (37L/min)
Supply Hose and Fitting Size Minimum Orifice Size	No. 6 9/32in. (7mm)	No. 6 9/32in. (7mm)

① Flow less than minimum will result in slow faceplate speed.

② Flow greater than maximum can result in excessive faceplate speed, reduced system performance and short hydraulic system life.

Hydraulic Oil – Cascade attachments are compatible with SAE 10W petroleum base oil per Mil. Spec. MIL-O-5606 or MIL-O-2104B.

Use of synthetic or aqueous base hydraulic oil is not recommended. Contact Cascade if fire resistant hydraulic oil must be used.

2659w-151/5

4.1-1

Truck System Requirements

- The lift truck must supply sufficient hydraulic pressure to handle the heaviest load. **PRESSURE MUST NOT EXCEED 2300 PSI (160 BAR).**
- Hydraulic flow should fall within the volume range shown in the table.
- The truck hydraulic system must supply hydraulic oil to the attachment that meets the specification shown in the table.

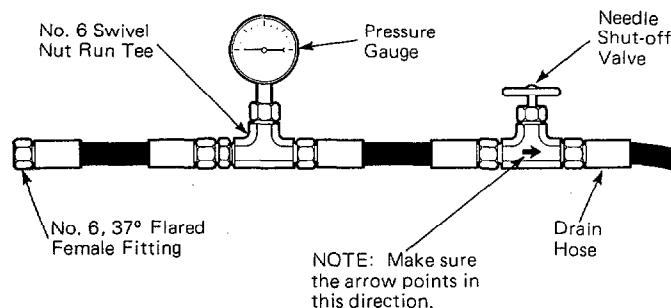
4.1-2

Tools Required

In addition to a normal selection of hand tools, you will need:

- Two No. 6 hoses with No. 6 female fittings.
- A pressure gauge capable of measuring pressure to 2500 psi (175 bar), Cascade P/N 671212.
- An inline flow meter capable of measuring hydraulic flow to 20 GPM (80 L/min.), Cascade P/N 671477.
- A No. 6 swivel nut run tee (37° JIC) suitable for mounting the gauge.
- A metal plug and cap (No. 6, 37° JIC) for plugging hoses and capping fittings.
- A needle shutoff valve, rated for 2500 psi (175 bar), Cascade P/N 673681.
- Voltmeter (or test light) for solenoid equipped attachments.
- Ohmmeter for solenoid equipped attachments.

Assemble the hydraulic test instruments as shown.



Section 4 Troubleshooting

4.1-3 Get All The Facts Before You Begin Working On The Attachment

It is important that you gather all the facts regarding the problem before you begin service procedures. The best way is to talk with the operator. Ask for a complete description of the malfunction. The following guidelines will help you decide where to begin your troubleshooting procedures.

A. Push/Pull Circuit

- Attachment will not pull load.
- Faceplate will not extend or retract.
- Faceplate operates slowly.
- Gripper bar will not lower or raise.
- Gripper bar is not sequenced with the push/pull function.
- Gripper bar will not hold the slip sheet when pulling load onto platens.

If you encounter one of these problems, refer to section 4.3.

B. Sideshift Circuit

- Attachment will not sideshift.
- Attachment sideshifts slowly.

If you encounter one of these problems, refer to section 4.4.

C. Adjustable Platen Circuit

- Platens will not move.
- Platens move very slowly.

If you encounter one of these problems refer to section 4.5.

D. Sheet Retainer Circuit

- Sheet retainer bar will not move.
- Sheet retainer will not hold slip sheet when pushing load off platens.
- Sheet retainer bar moves slowly.

If you encounter one of these problems refer to section 4.6.

E. Sideshifting Platen Circuit

- Platen will not sideshift.
- Platen sideshifts slowly.

If you encounter one of these problems refer to section 4.4

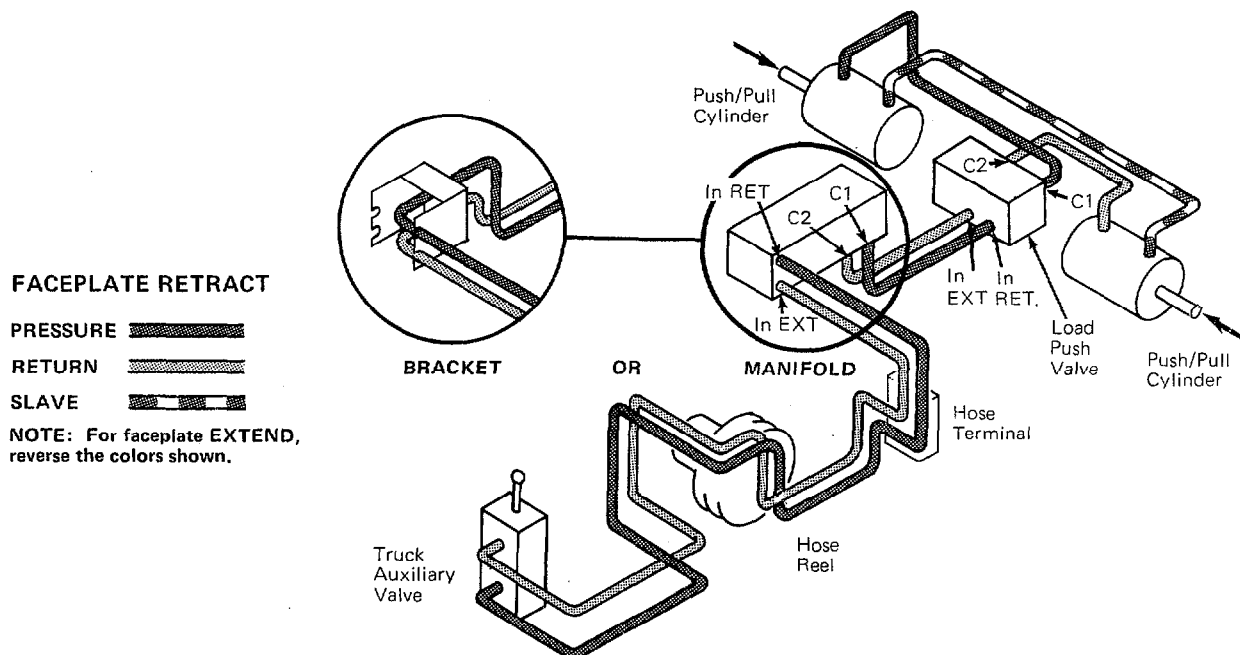
F. Electrical Faceplate Stop Circuit

- Faceplate will not stop.
- Faceplate will not stop in correct position.

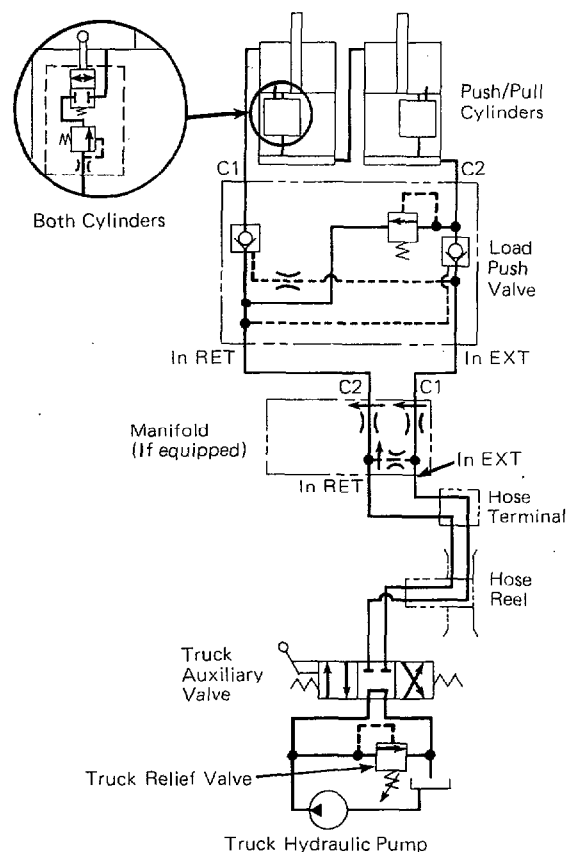
If you encounter one of these problems refer to section 4.7.

4.2 Plumbing

4.2-1 Hosing Diagram—Load Push (Non-Sideshifting)



4.2-2 Circuit Schematic



4 Troubleshooting

4.2-3 Hosing Diagram—Load Push (Sideshift without Solenoid)

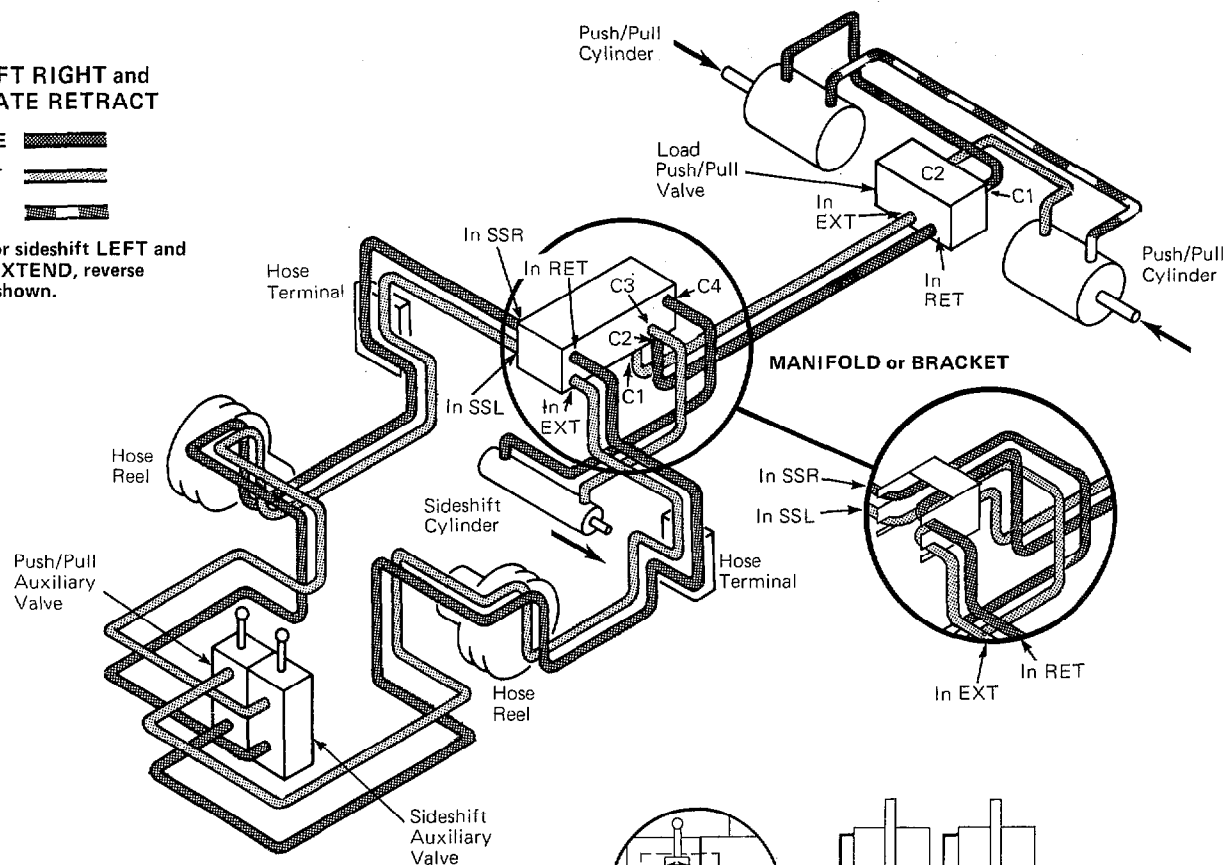
**SIDESHIFT RIGHT and
FACEPLATE RETRACT**

PRESSURE 

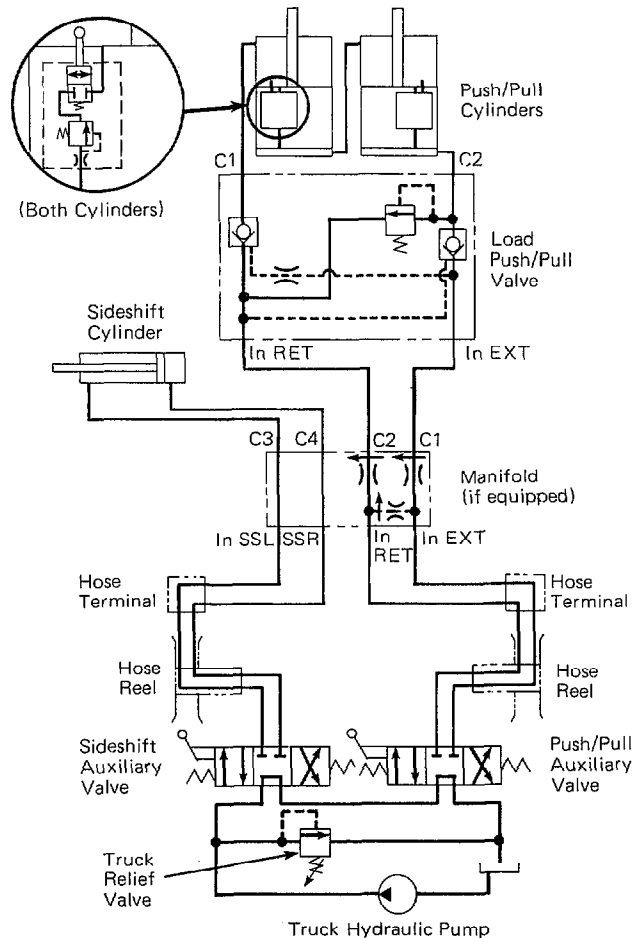
RETURN 

SLAVE 

NOTE: For sideshift LEFT and
faceplate EXTEND, reverse
the colors shown.



4.2-4 Circuit Schematic



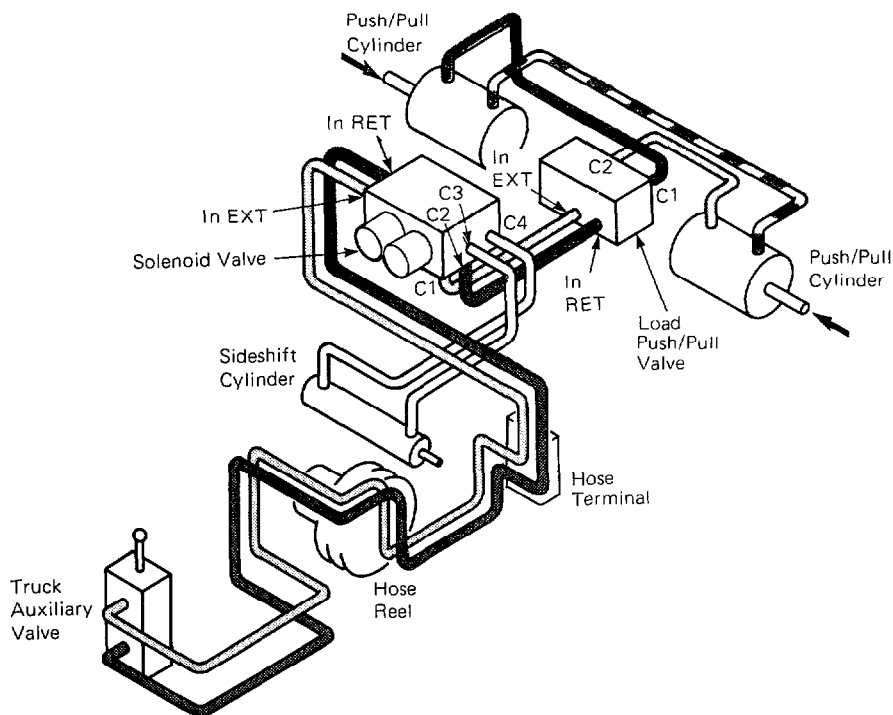
Section 4 Troubleshooting

4.2-5 Hosing Diagram—Load Push (Sideshift with Solenoid)

FACEPLATE RETRACT

PRESSURE 
RETURN 
SLAVE 

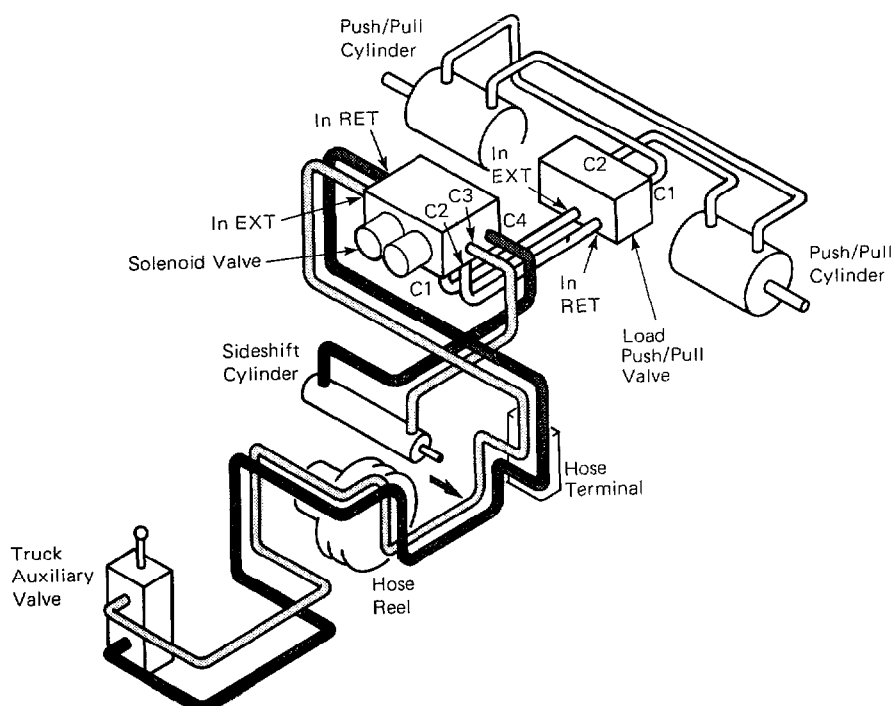
NOTE: For faceplate **EXTEND**,
reverse the colors shown.



SIDESHIFT RIGHT

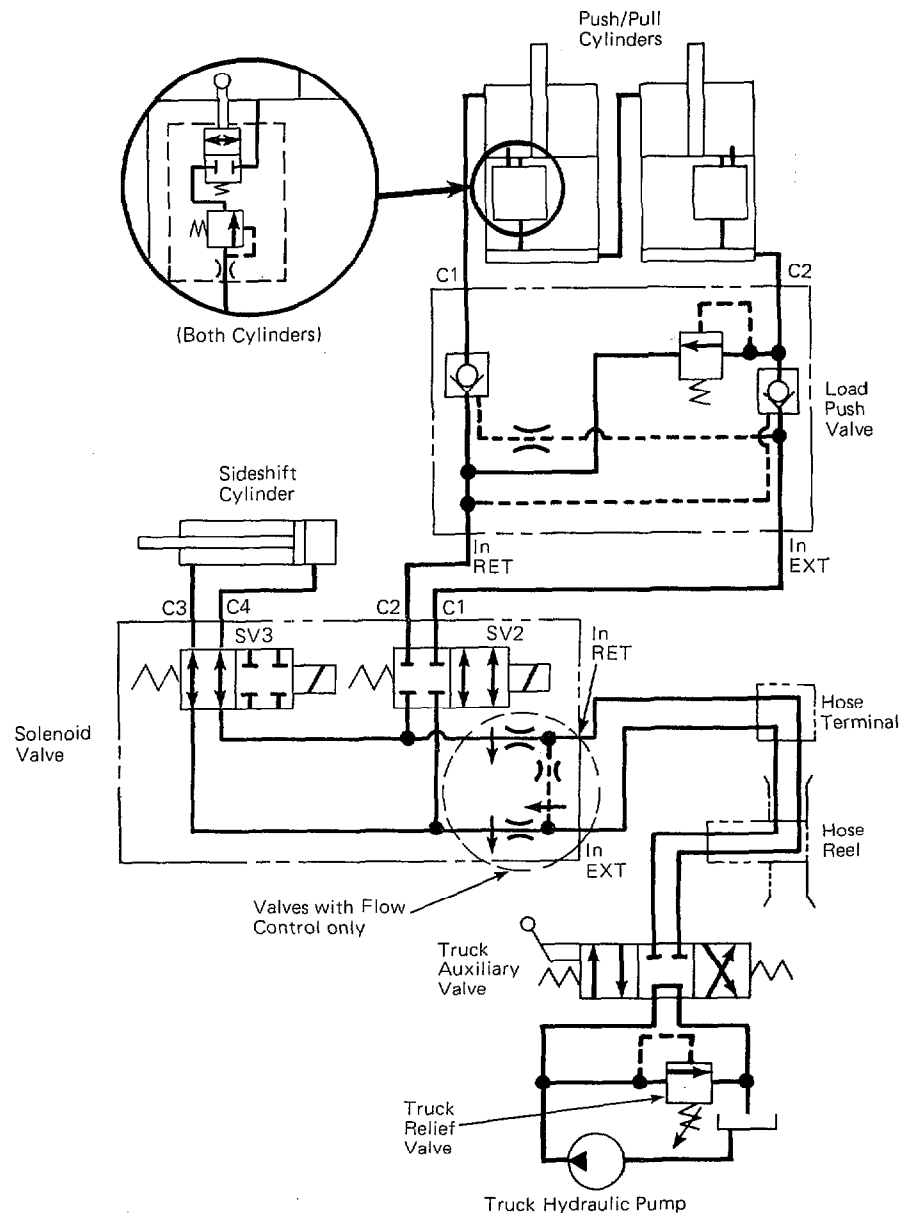
PRESSURE 
RETURN 

NOTE: For sideshift **LEFT**,
reverse the colors shown.



4 Troubleshooting

4.2-6 Circuit Schematic—Load Push (Sideshift with Solenoid)



4 Troubleshooting

4.2-7 Hosing Diagram—Load Push/Pull (Non-Sideshifting)

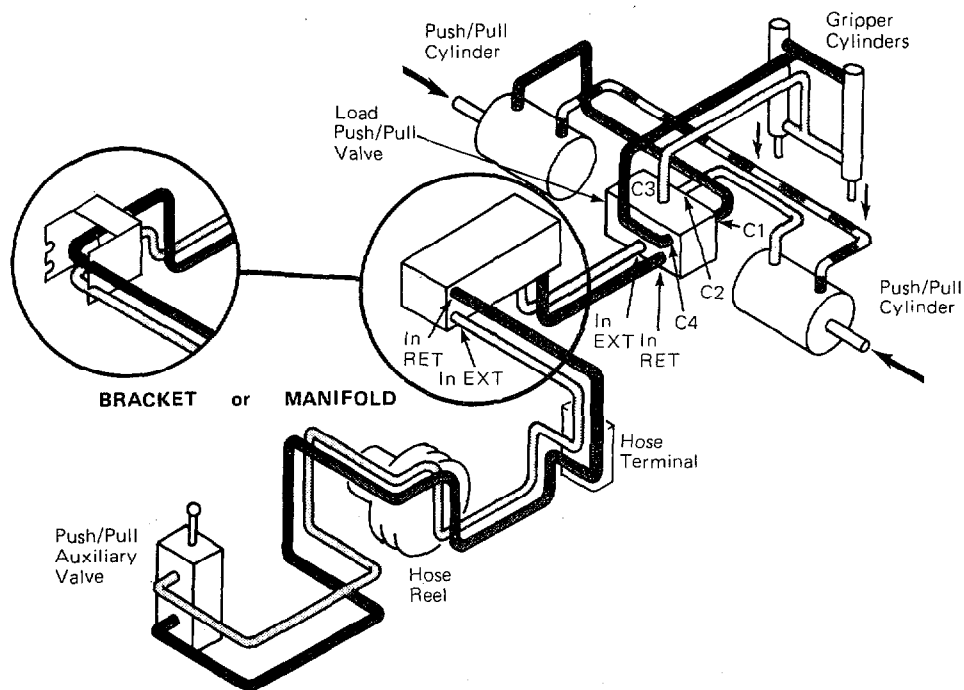
FACEPLATE RETRACT and
GRIPPER BAR DOWN

PRESSURE 

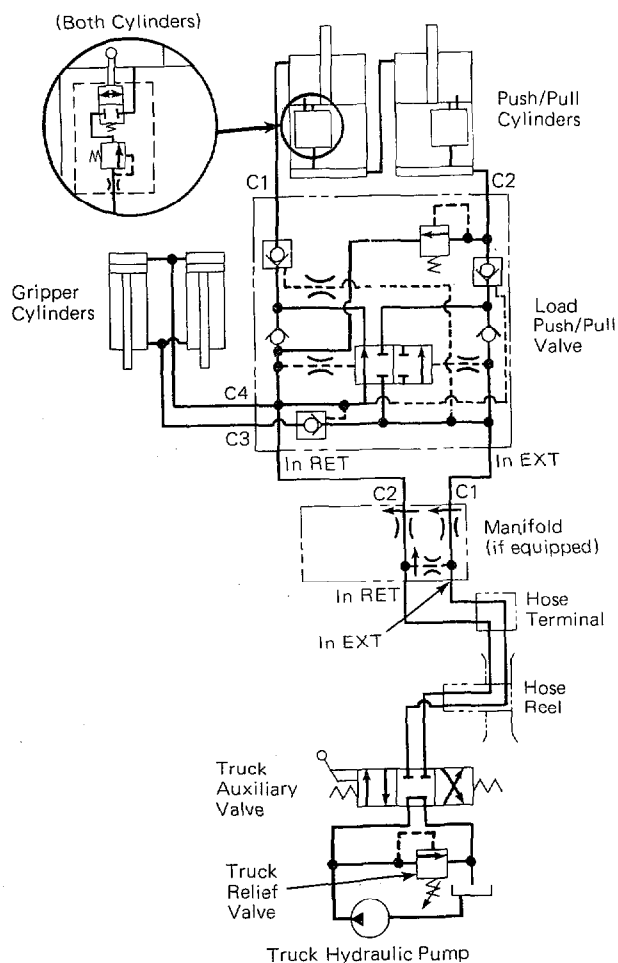
RETURN 

SLAVE 

NOTE: For faceplate EXTEND and
gripper bar UP, reverse the colors shown.



4.2-8 Circuit Schematic

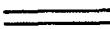


4 Troubleshooting

4.2-9 Hosing Diagram—Load Push/Pull (Sideshift without Solenoid)

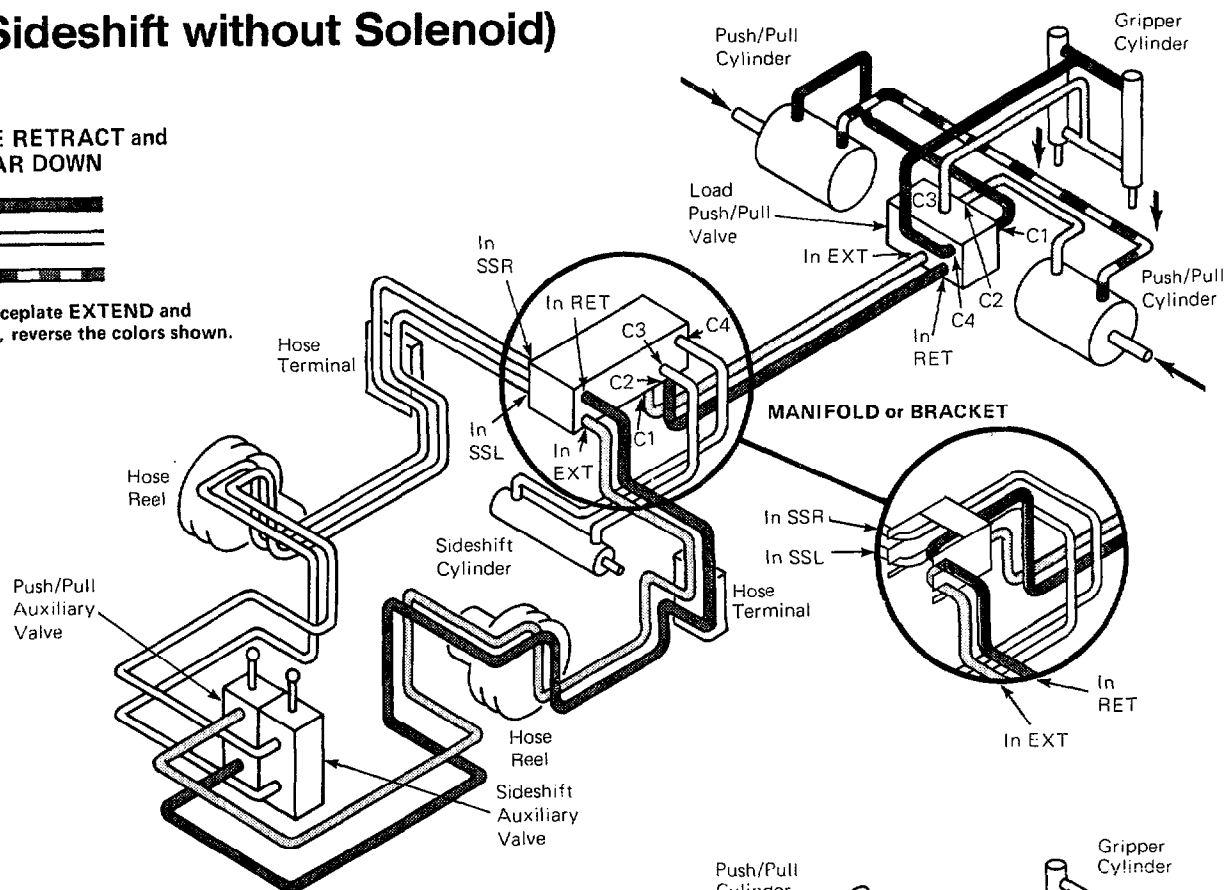
FACEPLATE RETRACT and
GRIPPER BAR DOWN

PRESSURE 

RETURN 

SLAVE 

NOTE: For faceplate EXTEND and
gripper bar UP, reverse the colors shown.

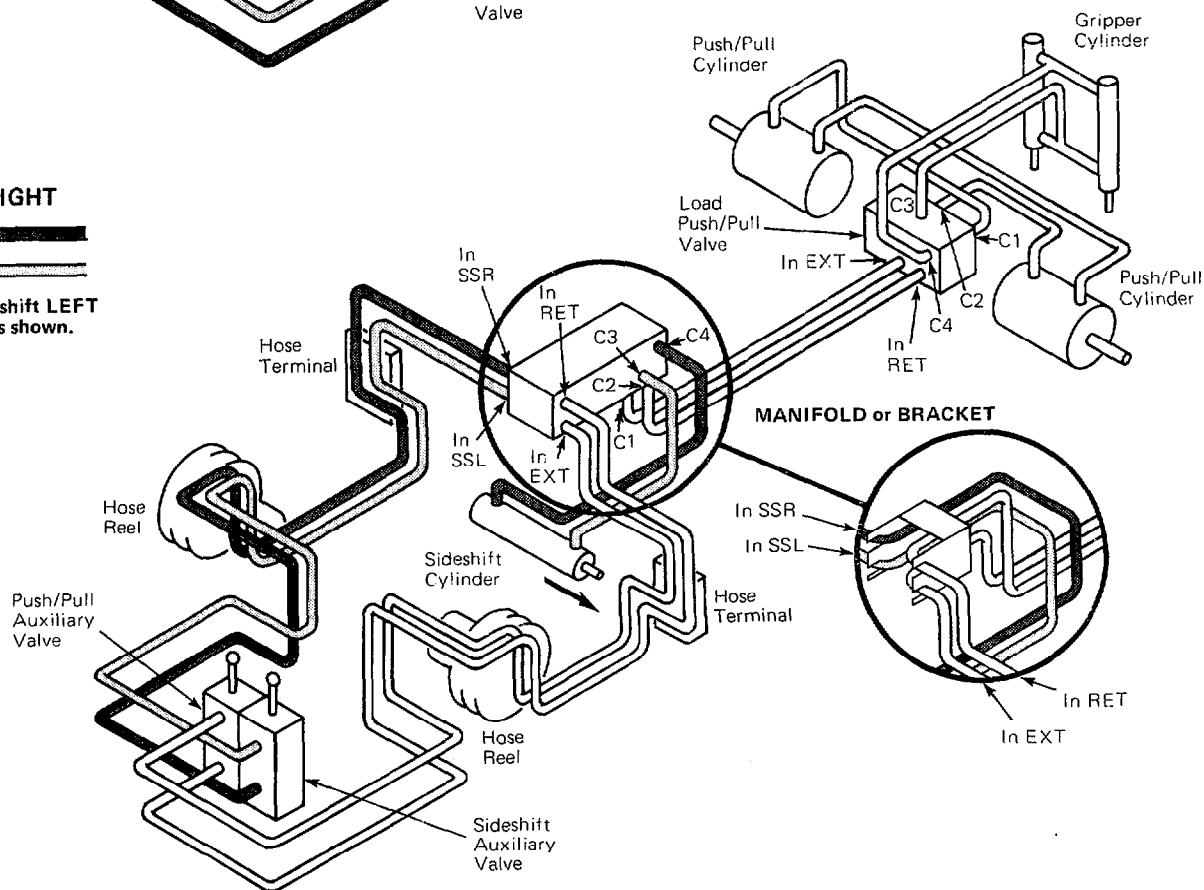


SIDESHIFT RIGHT

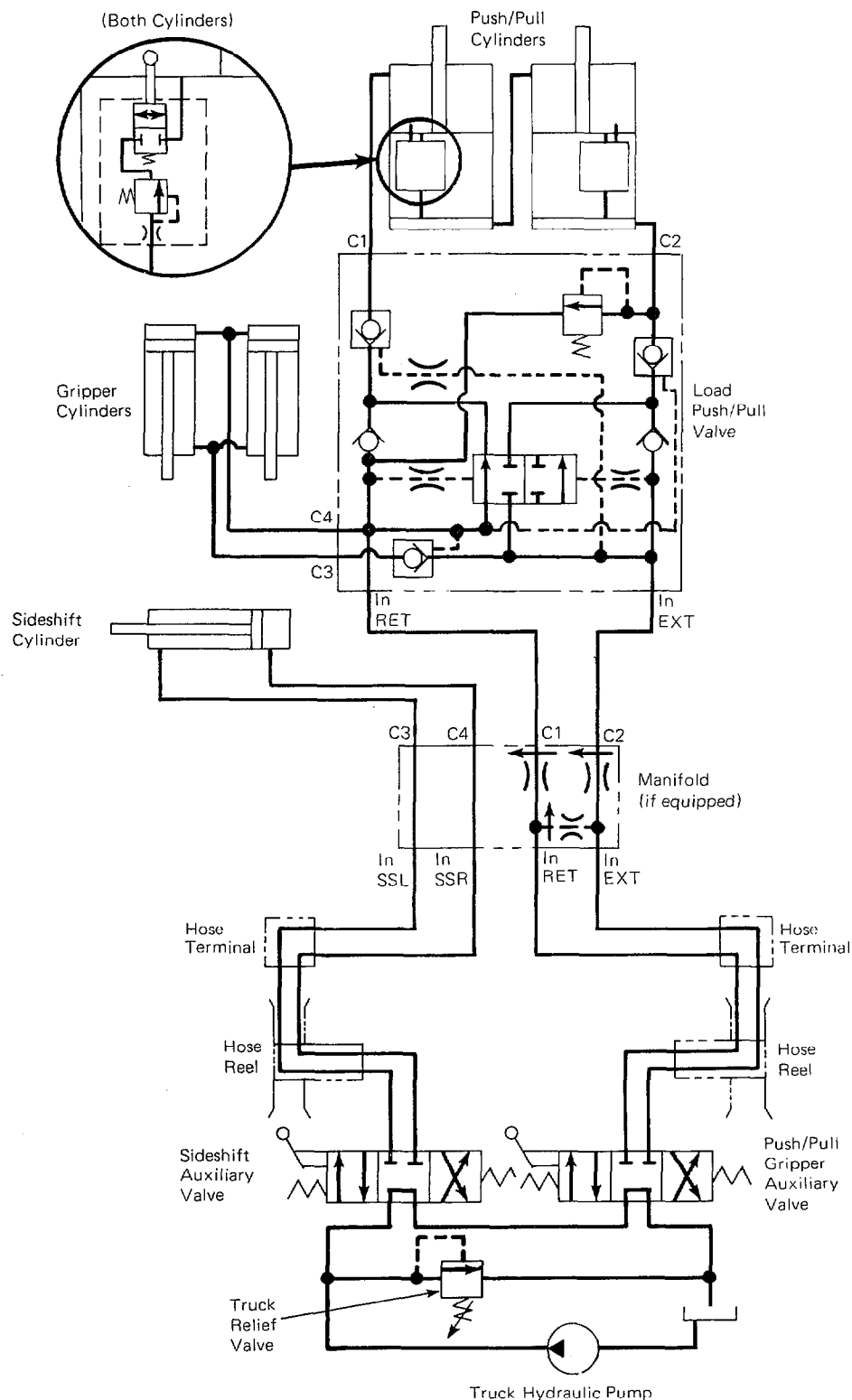
PRESSURE 

RETURN 

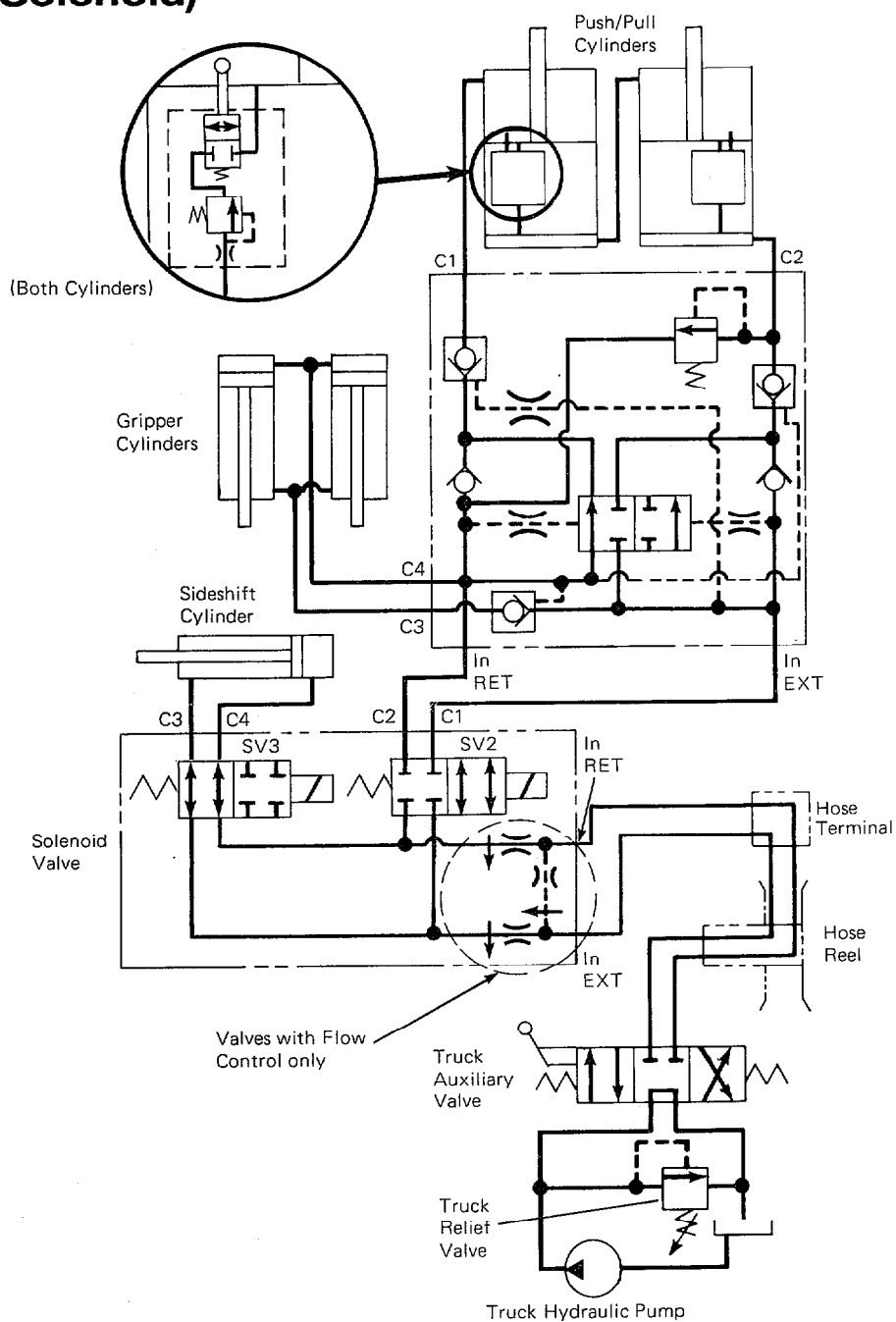
NOTE: For sideshift LEFT
reverse the colors shown.



4.2-10 Circuit Schematic—Load Push/Pull (Sideshift without Solenoid)



4.2-12 Circuit Schematic—Load Push/Pull (Sideshift with Solenoid)



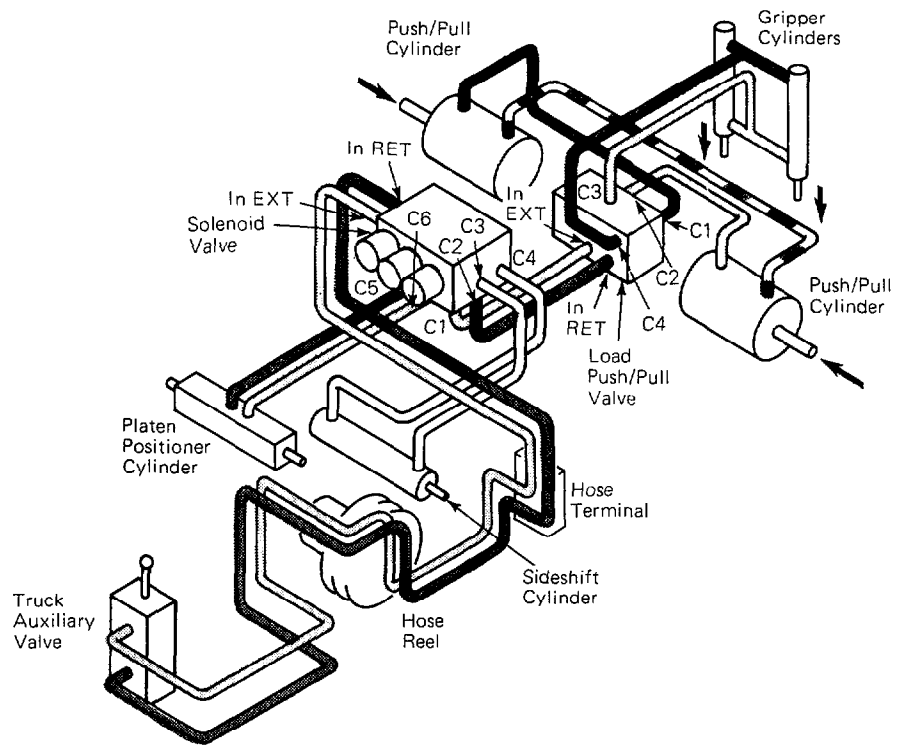
4 Troubleshooting

4.2-13 Hosing Diagram—Load Push/Pull (Hydraulically Adjustable Platens)

FACEPLATE RETRACT,
GRIPPER BAR DOWN, and
PLATENS POSITIONED WIDE

PRESSURE 
RETURN 
SLAVE 

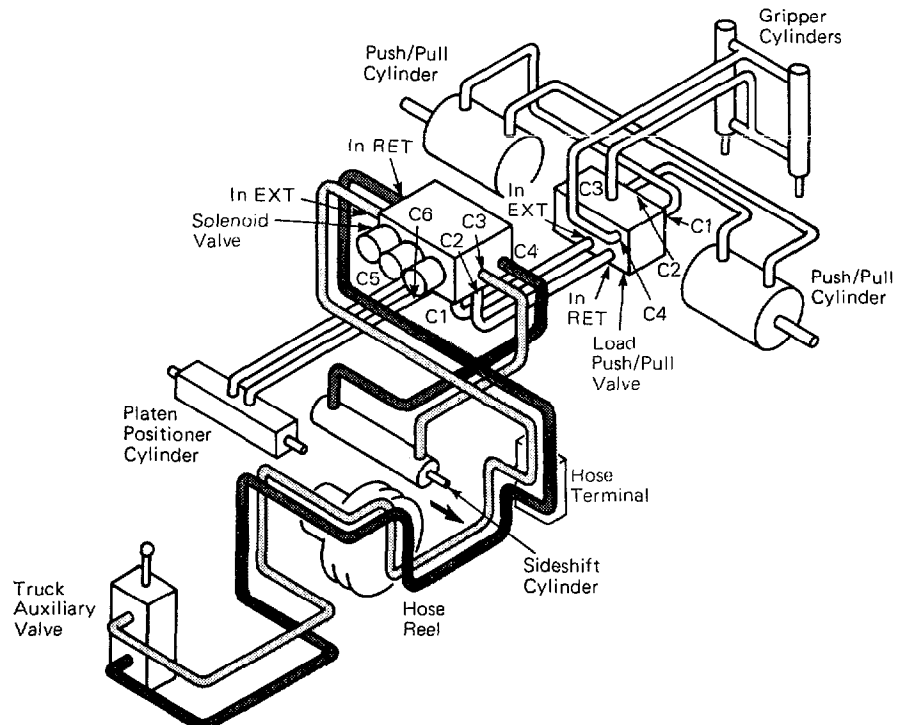
NOTE: For faceplate EXTENDED,
gripper bar UP, and platens positioned
NARROW, reverse the colors shown.



SIDESHIFT RIGHT

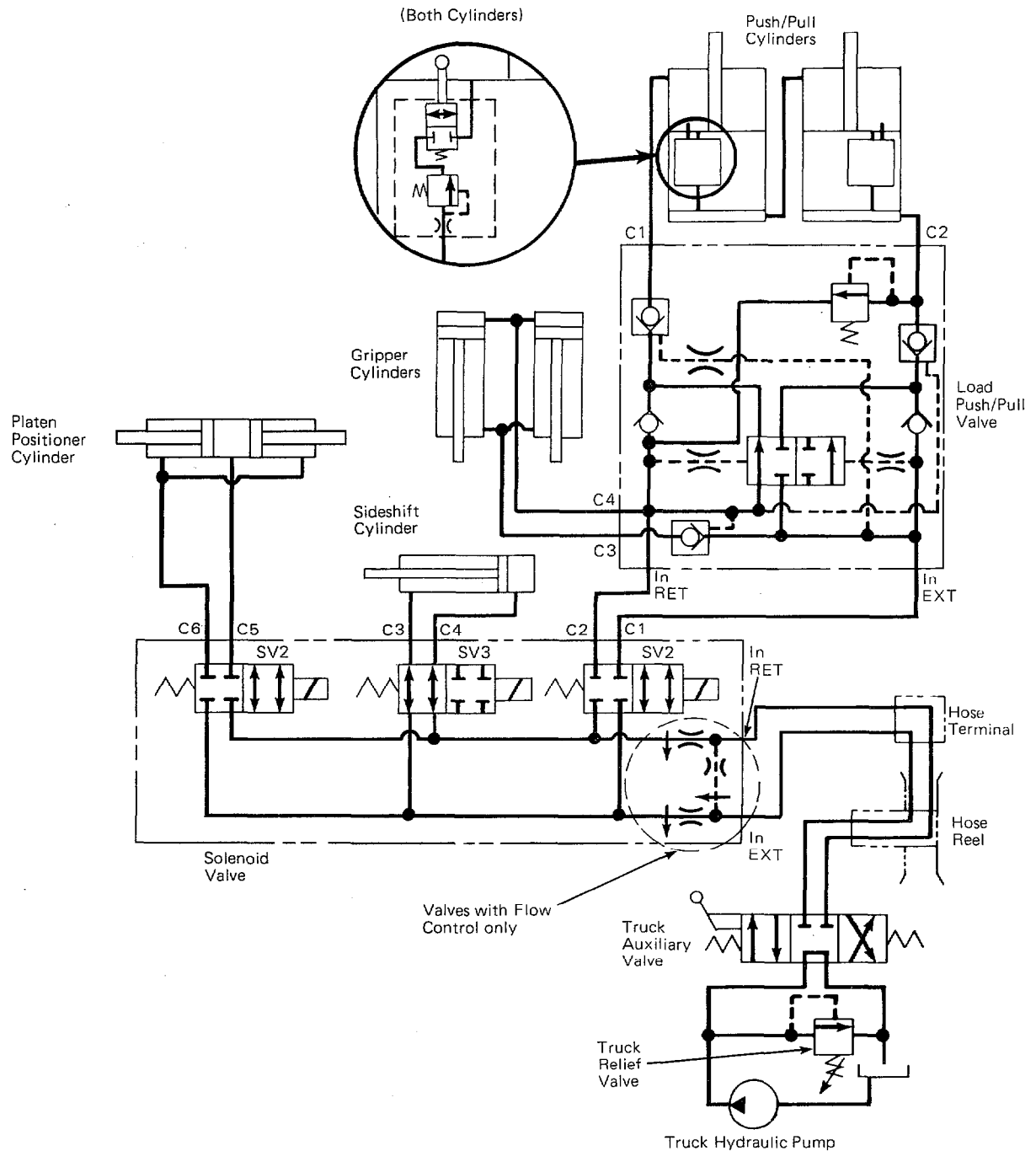
PRESSURE 
RETURN 

NOTE: For sideshift LEFT,
reverse the colors shown.

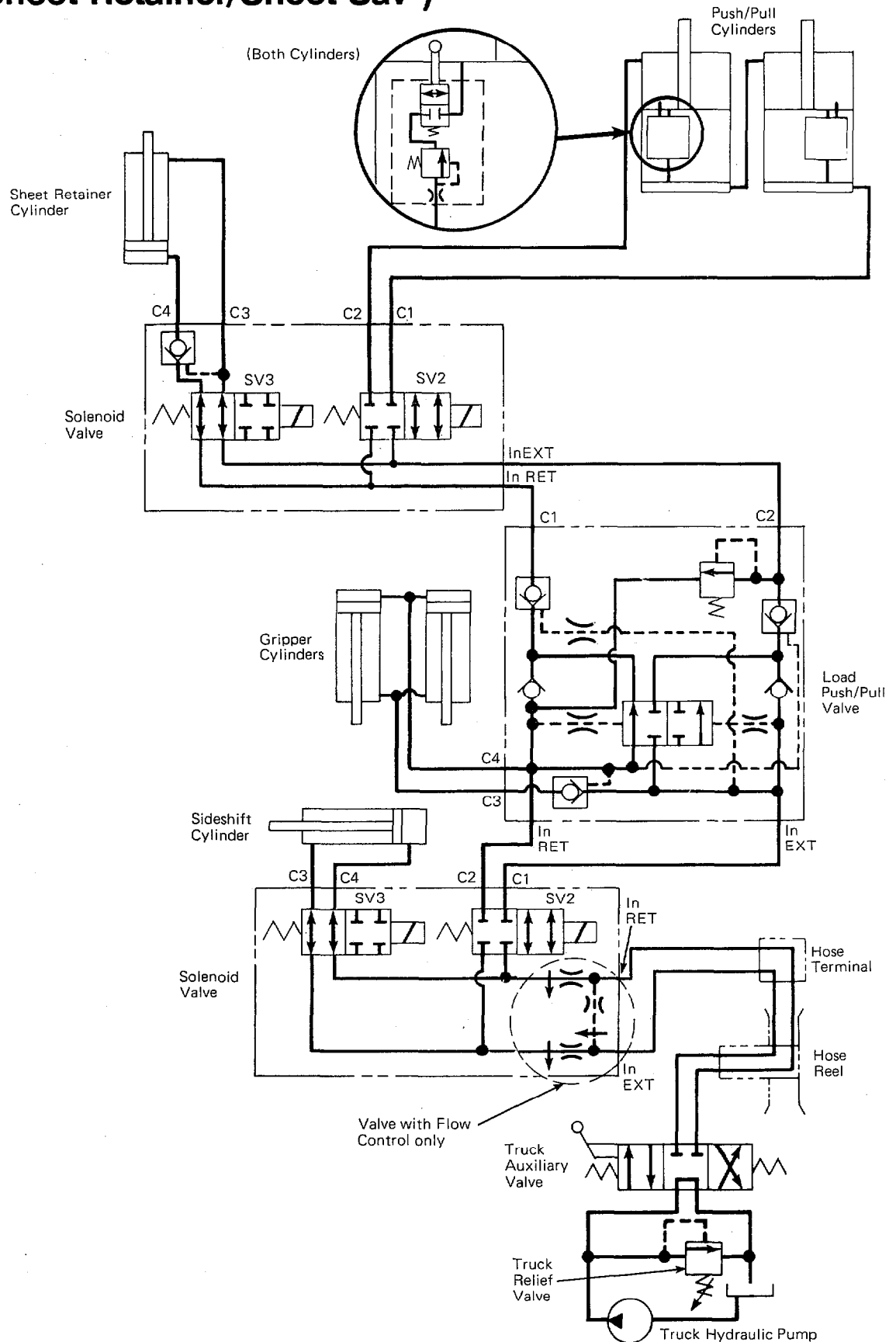


Section 4 Troubleshooting

4.2-14 Circuit Schematic—Load Push/Pull (Hydraulically Adjustable Platens)



4.2-16 Circuit Schematic—Load Push/Pull (Sheet Retainer/Sheet Sav®)



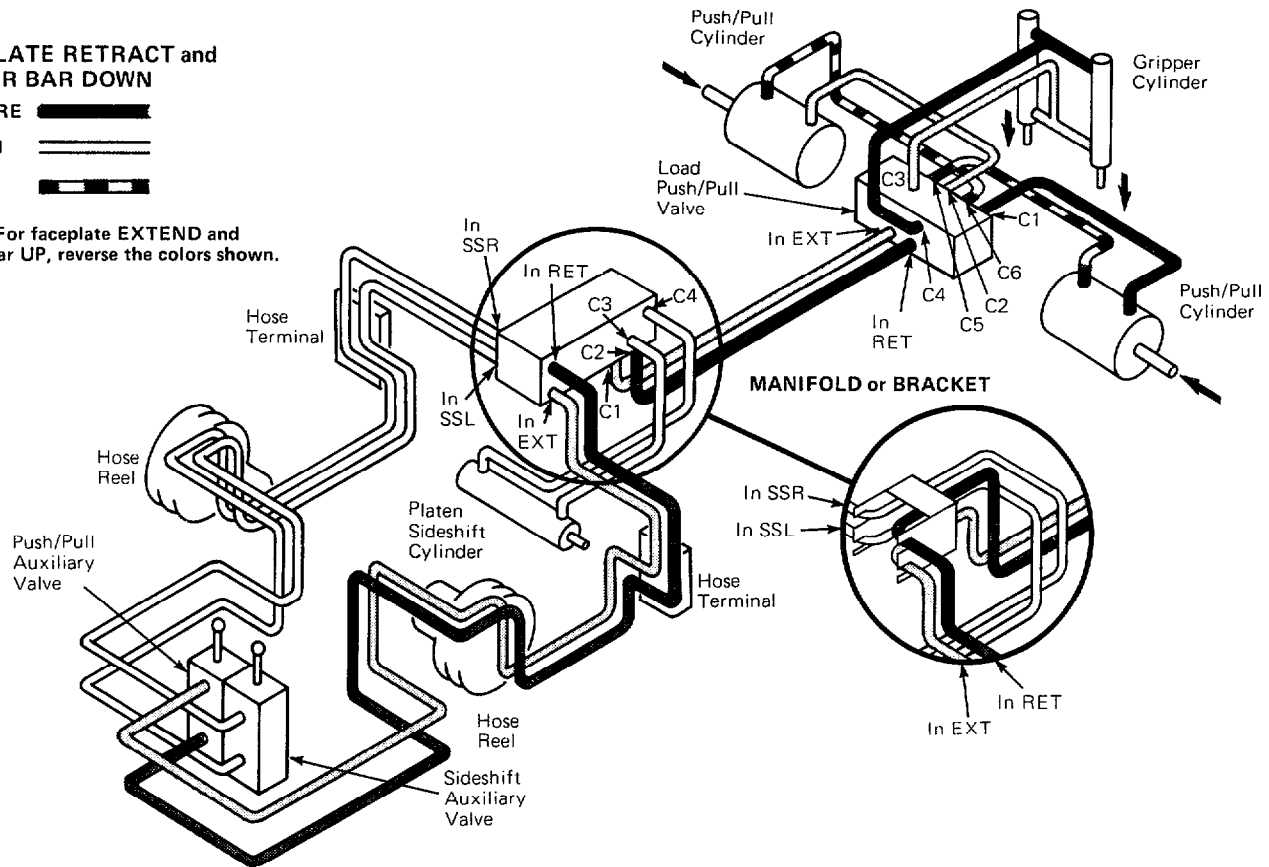
Section 4 Troubleshooting

4.2-17 Hosing Diagram—Load Push/Pull (Sideshifting Platens)

FACEPLATE RETRACT and
GRIPPER BAR DOWN

PRESSURE 
RETURN 
SLAVE 

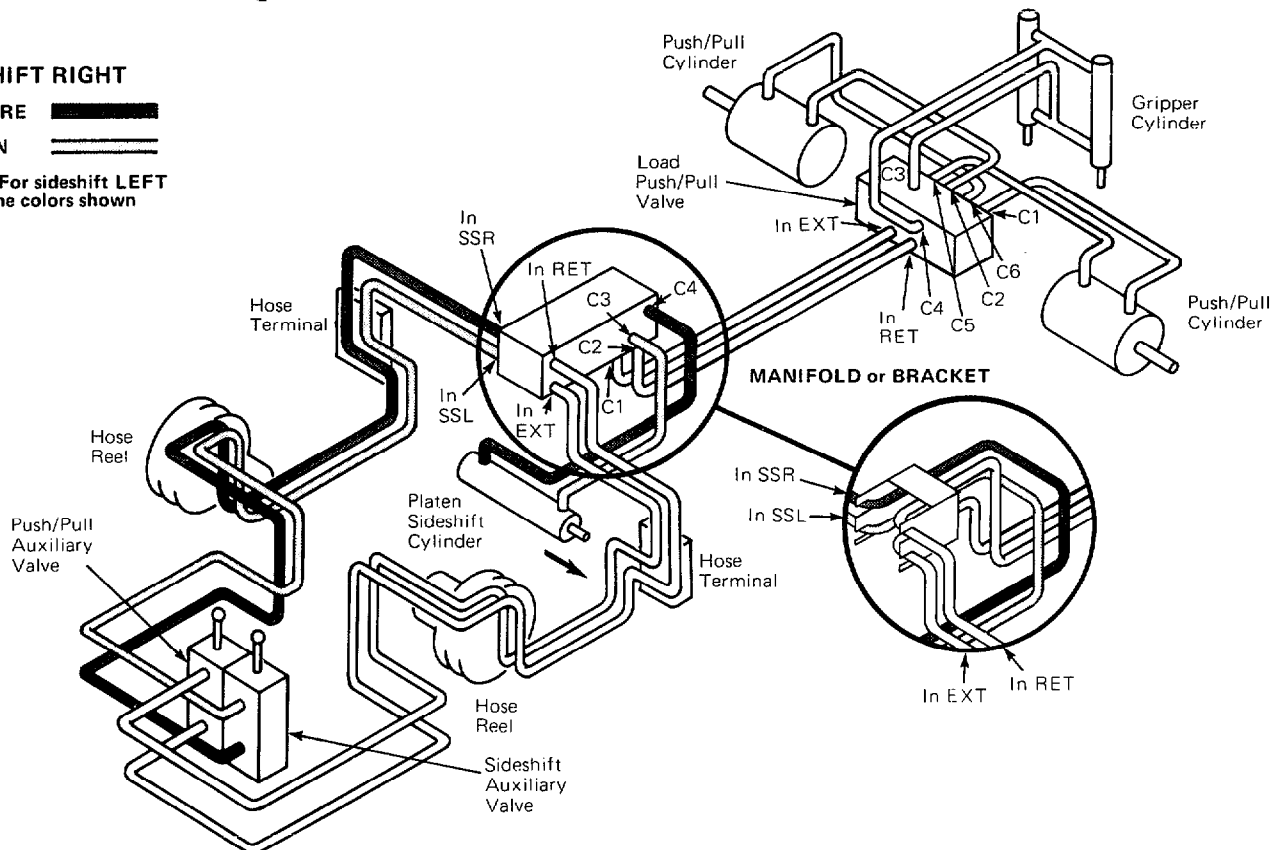
NOTE: For faceplate EXTEND and
gripper bar UP, reverse the colors shown.



SIDESHIFT RIGHT

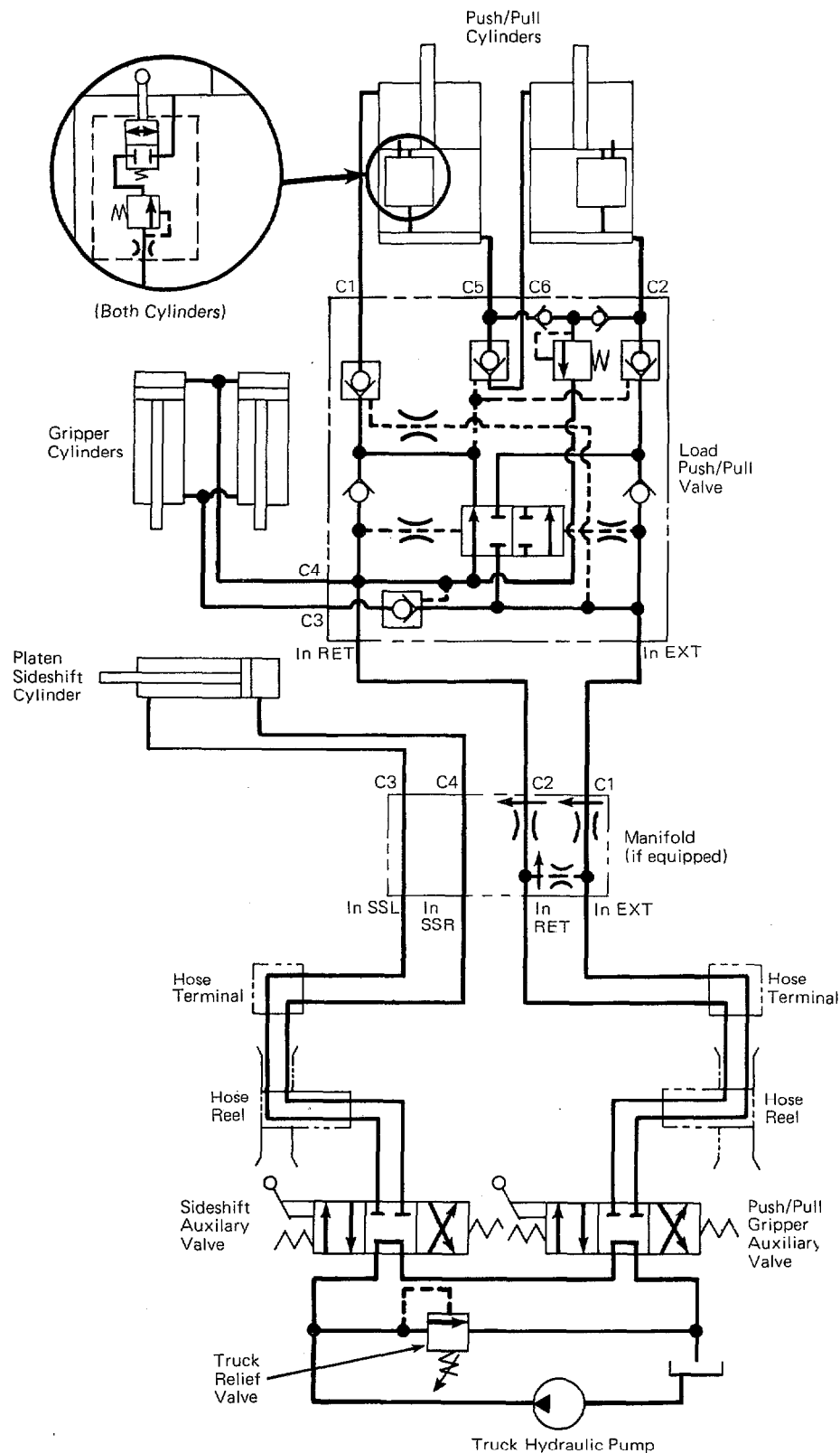
PRESSURE 
RETURN 

NOTE: For sideshift LEFT
reverse the colors shown



Section 4 Troubleshooting

4.2-18 Circuit Schematic—Load Push/Pull (Sideshifting Platens)



4.3

Push/Pull Circuit

There are seven potential problems that could affect push/pull operation.

- Insufficient hydraulic pressure
- External leaks
- Faulty electrical connection
- Defective solenoid coil or cartridge (on solenoid-equipped attachments)
- Worn or defective cylinder seals
- Valve assembly malfunction
- Kinked supply hoses

Before proceeding with a test, determine whether the push function, pull function, or the gripper function is at fault. Then follow the check list under the problem function (Section 4.3-1, 4.3-2, 4.3-3 or 4.3-4) to isolate the problem area.

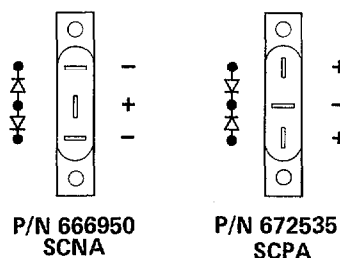
4.3-1

Electrical Troubleshooting—Solenoid Equipped Attachments

See the wire diagrams and schematics shown in Section 2.3-2 step 11. Use the proper schematic while following the steps below.

1. Check the control knob circuit fuse. Replace if necessary.
2. Check for loose electrical connections at the truck ignition switch, control knob button(s), solenoid coil terminals and diodes.
3. Remove the diode(s) from the solenoid coil terminal(s). Test with an ohmmeter for high resistance in one direction and no resistance in the other direction. If there is no resistance in both directions, replace the diode.
4. **Three Function Attachments** – Remove the three electrical leads from the frame mounted diode. Test for high resistance in one direction and no resistance in the other direction between the center terminal and each of the outer terminals. If there is no resistance in both directions between the center terminal and either of the outer terminals, replace the diode.
5. Disconnect the electrical leads from the solenoid coil terminals. Use a voltmeter or test light to take a current reading at the electrical leads from the control knob button when the button is depressed.
 - If there is **no** current to the solenoid, troubleshoot the electrical circuit for shorts.
 - If there **is** current to the solenoid, test for coil continuity.
6. To test for coil continuity, place an ohmmeter test lead on each solenoid coil terminal.
 - If there is an ohmmeter reading, the coil is good. Check the resistance against the resistance values in the chart to determine if the coil voltage is properly matched to the truck voltage.
 - If the coil is good and the coil voltage is correct, but the solenoid does not "click" when the control button is depressed, the solenoid cartridge is jammed and should be replaced.
 - If there is **no** ohmmeter reading shown, the solenoid coil is defective and should be replaced.

DIODES



COIL VOLTAGE	COIL PART NUMBER	APPROXIMATE RESISTANCE
12V	667327	6±1 Ohms
24V	667328	28±1 Ohms
36V	667329	70±1 Ohms
48V	667330	108±1 Ohms

NOTE: Ohm readings are for Cascade Coils, not Racine or Waterman type.

Section 4 Troubleshooting

4.3-2 Push Hydraulic Function



WARNING: Before removing any hoses, relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **TRUCK PRESSURE MUST NOT EXCEED 2300 PSI (160 BAR)**, measured at the hose terminal.
2. Check the flow volume at the hose terminal. See Section 6.1-1 for the recommended flow volumes. If the truck pressure and flow volume are correct, proceed with the troubleshooting.
3. At the attachment valve assembly, disconnect the supply hose that leads to the base end of the right-hand push/pull cylinder (as viewed from the driver's seat). Plug the cylinder supply hose with a No. 6 metal plug.
4. Connect a pressure gauge with a needle shutoff valve and drain line to the valve fitting (refer to Section 4.1-2 for an illustration of the gauge arrangement). Put the drain line in an empty container.
5. Open the needle valve no more than 1/2 to 1 full turn. Start the truck and let it idle.
6. Operate the truck "push" lever for 4 to 5 seconds, then close the needle valve tightly. Allow the gauge to reach and hold full truck relief pressure for 2 or 3 seconds, then release the "push" lever. Observe the pressure gauge and note the following:
 - If the gauge **does not** reach the specific truck pressure (a 100 psi/7 bar loss is OK), one of the following is responsible.

Internal Or External Leaks

Refer to the accompanying diagram and check all areas that could have external leaks. Repair as required and operate the attachment to determine if the problem has been solved.

Defective Push/Pull Solenoid (on attachments so equipped) Refer to Section 4.3-1, for solenoid tests.

Shuttle In The Valve Assembly Is Not Shifting

Refer to Section 5.3 for valve inspection and servicing procedures.

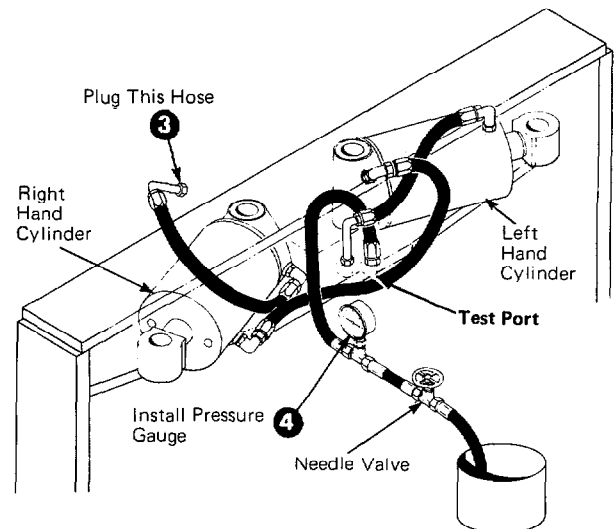
The Piloted Check Valve Or Relief Valve In The Valve Assembly Is Defective

Refer to Section 5.3 for valve inspection and servicing procedures.

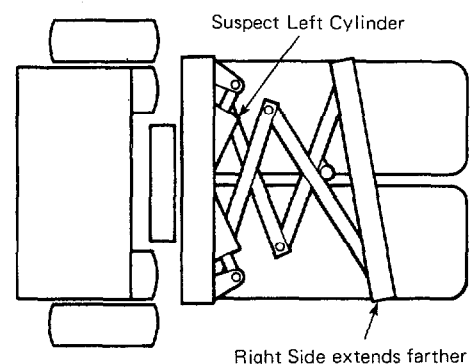
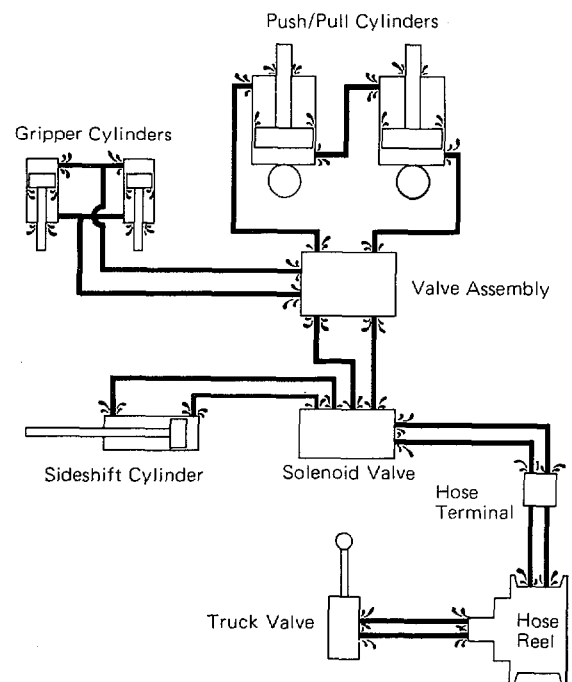
- If the gauge **does** reach truck pressure (a 100 psi/7 bar loss is OK), the following is responsible for a malfunctioning "push" circuit.

Push/Pull Cylinder Is Defective

When the faceplate extends unevenly with the right side out further than the left, suspect the left-hand cylinder; vice versa for the right-hand cylinder. To further check the cylinders individually, install a drain line to the base end port and apply pressure to retract the cylinder. A steady oil stream after full retraction indicates a bypass of oil at the piston inner or outer seals or compensator valve. Refer to Section 5.4 for cylinder inspection and servicing procedures.



PUSH FUNCTION TEST



DEFECTIVE PUSH/PULL CYLINDER

Section 4 Troubleshooting

4.3-3 Pull Hydraulic Function



WARNING: Before removing any hoses, relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. TRUCK PRESSURE MUST NOT EXCEED 2300 PSI (160 BAR), measured at the hose terminal.
2. Check the flow volume at the hose terminal. See Section 6.1-1 for the recommended flow volumes. If the truck pressure and flow volume are correct, proceed with the troubleshooting.
3. At the valve assembly, disconnect the supply hose that leads to the rod end of the left-hand push/pull cylinder (as viewed from the driver's seat). Plug the cylinder supply hose with a No. 6 metal plug.
4. Connect a pressure gauge with a needle shutoff valve and drain line to the valve fitting (refer to Section 4.1-2 for an illustration of the gauge arrangement). Put the drain line in an empty container.
5. Open the needle valve no more than $\frac{1}{2}$ to 1 full turn. Start the truck and let it idle.
6. Operate the truck "pull" lever for 4 to 5 seconds, then close the needle valve tightly. Allow the gauge to reach and hold full truck relief pressure for 2 or 3 seconds, then release the "pull" lever. Observe the pressure gauge and note the following:
 - If the gauge **does not** reach the specific truck pressure (a 100 psi/7 bar loss is OK), one of the following is responsible.

Internal Or External Leaks

Refer to the accompanying diagram and check all areas that could have external leaks. Repair as required and operate the attachment to determine if the problem has been solved.

Defective Push/Pull Solenoid (on attachments so equipped) Refer to Section 4.3-1, for solenoid tests.

Shuttle In The Valve Assembly Is Not Shifting

Refer to Section 5.3 for valve inspection and servicing procedures.

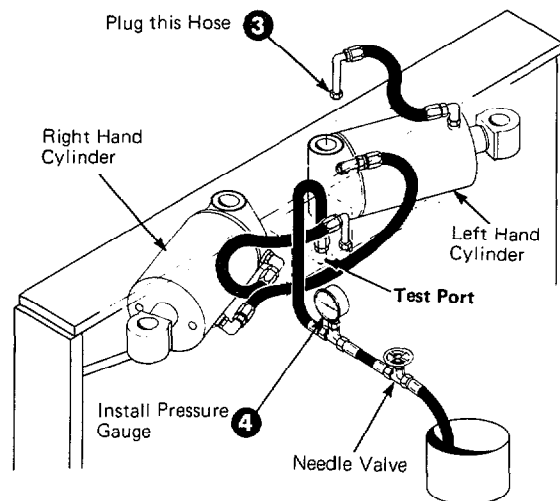
The Piloted Check Valve Or Relief Valve In The Valve Assembly Is Defective

Refer to Section 5.3 for valve inspection and servicing procedures.

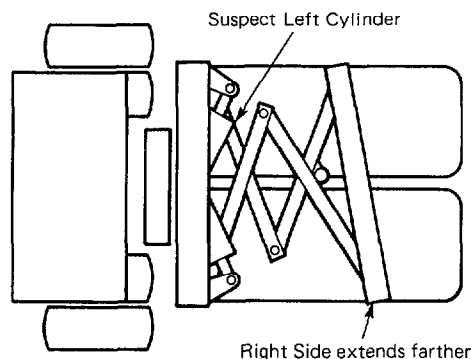
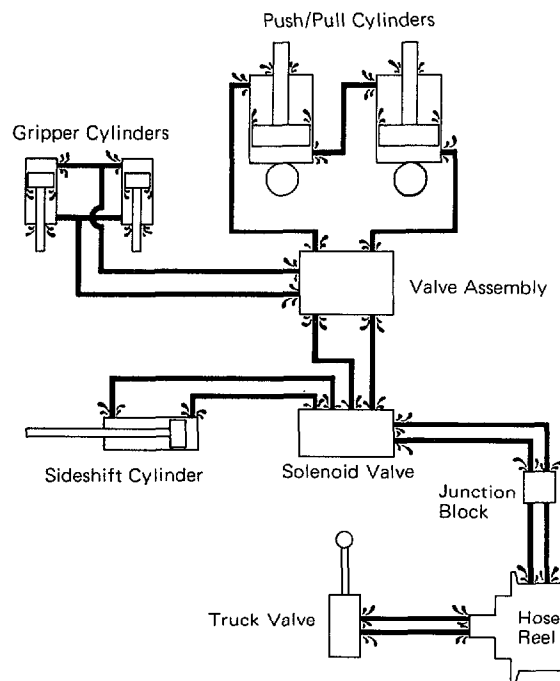
- If the gauge **does** reach truck pressure (a 100 psi/7 bar loss is OK), the following is responsible for a malfunctioning "pull" circuit.

Push/Pull Cylinder Is Defective

When the faceplate extends unevenly with the right side out further than the left, suspect the left-hand cylinder; vice versa for the right-hand cylinder. To further check the cylinders individually, install a drain line to the base end port and apply pressure to retract the cylinder. A steady oil stream after full retraction indicates a bypass of oil at the piston inner or outer seals or compensator valve. Refer to Section 5.4 for cylinder inspection and servicing procedures.



PULL FUNCTION TEST



DEFECTIVE PUSH/PULL CYLINDER

4.3-4 Gripper Function Troubleshooting

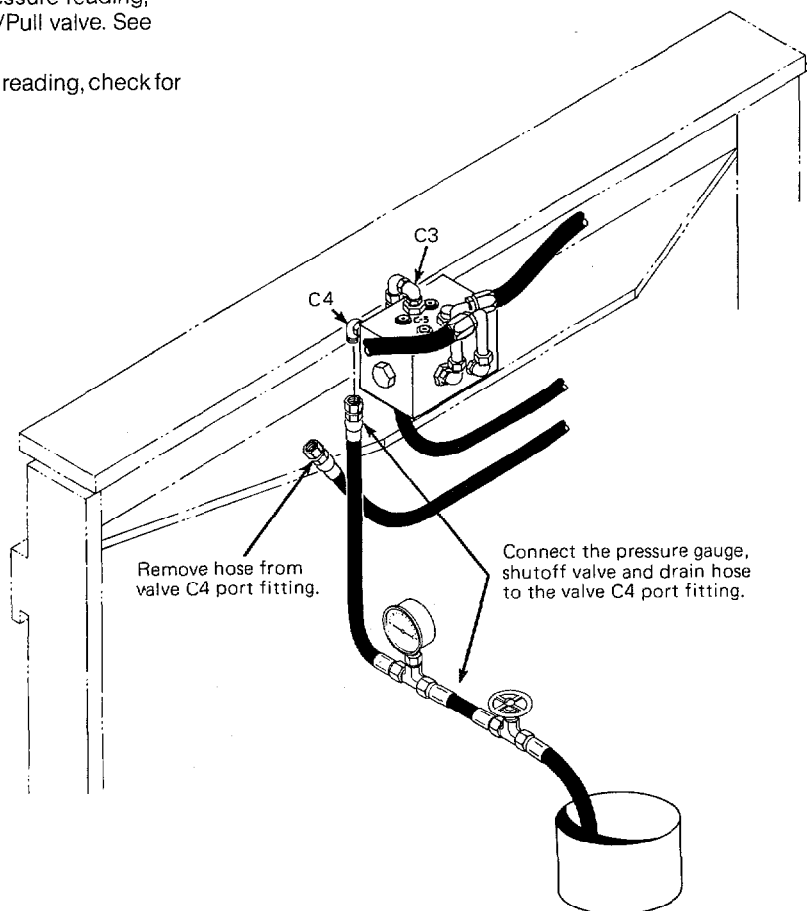


WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Inspect the gripper bar for mechanical jamming caused by bent or broken components.
2. Inspect the hoses from the Load Push/Pull valve to gripper cylinder. Replace the hoses if either is kinked.
3. Extend the faceplate. Disconnect the hose at the left hand push/pull cylinder rod end. Plug or cap the open ports and hoses with metal fittings.

Disconnect the hose connected between the rod end ports of the gripper cylinders. Install a drain hose to each of the cylinder rod end fittings. Operate the attachment in the pull function to extend the gripper cylinders.

- If oil **is** present as a steady stream after full extension, the cylinders require inspection and service as described in Section 5.4.
 - If oil **is not** present after full extension, continue troubleshooting.
4. Remove the hose from the Load Push/Pull valve C4 port fitting. Install the pressure gauge, shut off valve and drain hose to the fitting. Operate the attachment in the pull function.
 - If the gauge does not register a pressure reading, remove and service the Load Push/Pull valve. See Section 5.3 for service procedures.
 - If the gauge registers a low pressure reading, check for kinked hoses.



4.4 Troubleshooting the Sideshift Circuit

There are six potential problem areas that could affect the sideshift operation.

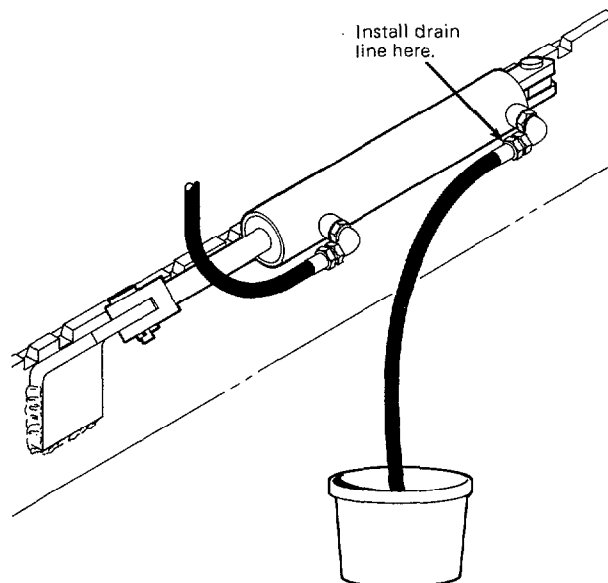
- Insufficient truck hydraulic pressure
- External Leaks
- Damaged sideshift bearing strips and segments
- Defective solenoid cartridge (on solenoid-equipped attachments)
- Faulty electrical connection
- Worn or defective cylinder seals

4.4-1 Sideshift Function Troubleshooting



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **TRUCK PRESSURE MUST NOT EXCEED 2000 PSI (140 bar),** measured at the junction block.
2. Check the flow volume at the junction block. See Section 6.1-1 for the recommended flow volumes. If the truck pressure and flow volume are correct, proceed with the troubleshooting.
3. On solenoid equipped attachments press the push/pull button.
 - If both the push/pull and sideshift solenoids "click", the valve is working correctly. Continue the troubleshooting check list.
 - If only the push/pull solenoid "clicks", the sideshift solenoid cartridge spool is jammed in the closed position. Replace the solenoid cartridge as described in Section 5.3-5.
4. Inspect the sideshift bearing strips and segments between the truck carriage and attachment frame for excessive wear. Replace if necessary. Keep the bearing strips and segments well lubricated with Dubois FGG-2 food industry grease. Cascade part no. 669306.
5. The sideshift cylinder seals may be worn. Install a drain line in the base end of the cylinder and apply pressure to retract the cylinder. A steady stream of oil after full retraction indicates a bypass at the seals. Refer to Section 5.4 for cylinder inspection and servicing procedures.



**VIEWED FROM FRONT
OF ATTACHMENT**

4.5

Troubleshooting the Hydraulically Adjustable Platen Circuit

There are five potential problem areas that could affect the adjustable platen operation.

- Insufficient truck hydraulic pressure
- Defective solenoid coil or cartridge
- Worn or defective cylinder seals
- Defective Diode
- Faulty electrical connection

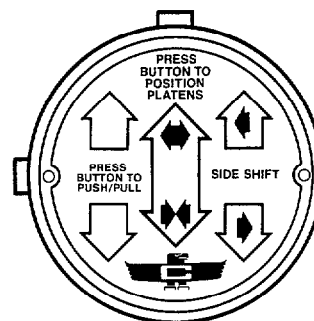
4.5-1

Adjustable Platen Function Troubleshooting

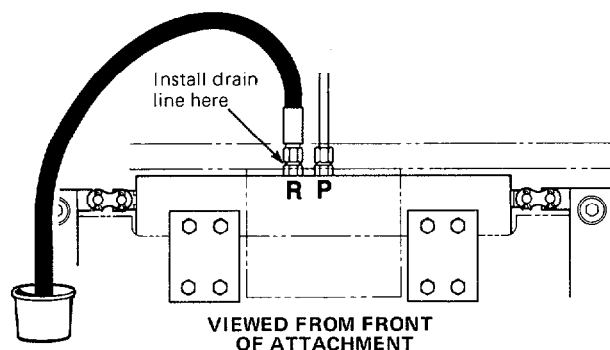


WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **TRUCK PRESSURE MUST NOT EXCEED 2000 PSI (140 bar),** measured at the junction block.
2. Check the flow volume at the junction block. See Section 6.1-1 for the recommended flow volumes. If the truck pressure and flow volume are correct, proceed with the pressure test.
3. Troubleshoot the adjustable platen electrical circuit as described in Section 4.3-1.
4. The adjustable platen cylinder seals may be worn. Extend the faceplate. Disconnect the hose at the left hand push/pull cylinder rod end. Plug or cap the open ports and hoses. Install a drain line as shown in the illustration and apply pressure to extend the cylinder. A steady stream of oil after full-extension indicates a bypass at the seals. Refer to Section 5.4 for cylinder inspection and servicing procedures.



THREE-FUNCTION
(Two-button control knob)



4 Troubleshooting

4.6 Troubleshooting the Sheet Retainer Circuit

There are five potential problem areas that could affect the sheet retainer operations.

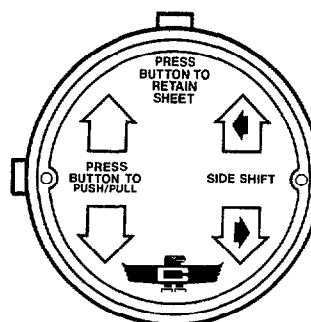
- Insufficient truck hydraulic pressure
- Defective solenoid coil or cartridge
- Worn or defective cylinder seals
- Defective Diode
- Faulty electrical connection

4.6-1 Sheet Retainer Function Troubleshooting

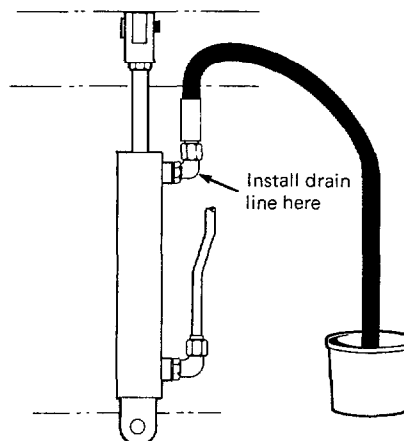


WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

1. Check the pressure delivered by the truck. Refer to the truck service manual. The pressure must be within 100 psi (7 bar) of specified truck pressure. **TRUCK PRESSURE MUST NOT EXCEED 2000 PSI (140 bar),** measured at the junction block.
2. Check the flow volume at the junction block. See Section 6.1-1 for the recommended flow volumes. If the truck pressure and flow volume are correct, proceed with the pressure test.
3. Troubleshoot the sheet retainer electrical circuit as described in Section 4.3-1.
4. The sheet retainer cylinder seals may be worn. Extend the faceplate. Disconnect the hose at the left hand push/pull cylinder rod end. Plug or cap the open ports and hoses. Install a drain line as shown in the illustration and apply pressure to extend the cylinder. A steady stream of oil after full extension indicates a bypass at the seals. Refer to Section 5.4 for cylinder inspection and servicing procedures.



THREE-FUNCTION
(Two-button control knob)



VIEWED FROM FRONT
OF ATTACHMENT

4.7

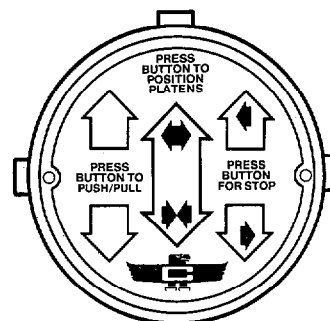
Troubleshooting the Electrical Faceplate Stop Groups

There are three potential areas that could effect the electrical faceplate stop operations.

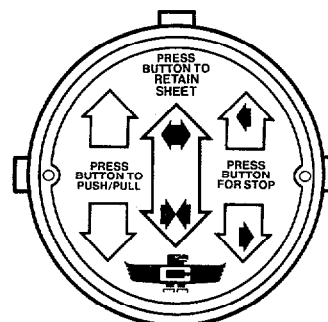
- Defective limit switch
- Improper limit switch actuator adjustment
- Faulty electrical connection

4.7-1 Electrical Faceplate Stop Function Troubleshooting

1. Adjust the limit switch actuator as described in Section 5.7-1.
2. Operate the attachment in the push/pull function without the stop button depressed.
 - If the push/pull function **is** working properly, continue the troubleshooting check list.
 - If the push/pull function **is not** working properly, troubleshoot the push/pull electrical circuit as described in Section 4.3-1.
3. Disconnect the electrical leads at the limit switch. See the wire diagrams and schematics shown in Section 2.3-2 step 11. Use a voltmeter or test light to take a current reading at the electrical leads from the control knob button when the button is depressed.
 - If there **is no** current to the limit switch electrical leads, troubleshoot the electrical circuit for shorts.
 - If there **is** current to the limit switch electrical leads, test the limit switch.
4. To test the limit switch, place the ohmmeter leads across the limit switch leads. With the switch in the neutral position, the ohmmeter should register a reading. The ohmmeter should not show a reading when the limit switch is activated.
 - If the limit switch fails either of these tests, replace and adjust the switch as described in Section 5.7-1.



THREE-FUNCTION
(Three-button control knob)



THREE-FUNCTION
(Three-button control knob)

5.1

Attachment Removal and Installation

- ① Fully extend the faceplate.
- ② Lower the attachment onto a pallet bar.
- ③ Disconnect the Lower Hooks.

Bolt On Type—Remove the lower mounting hooks. For reassembly, tighten the capscrews to a torque of 105–115 ft.-lbs. (140–155 N·m).

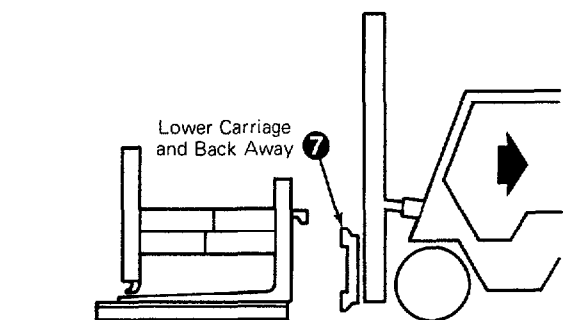
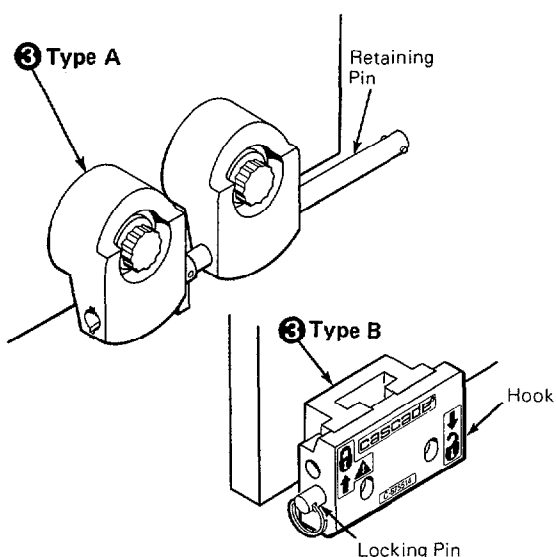
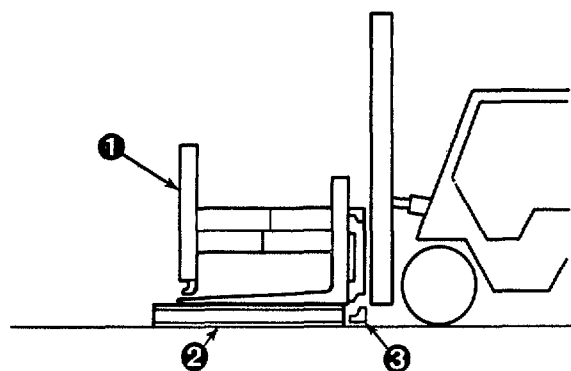
Quick Change Type A—Pull out the retaining pin and rotate the hooks to the position shown. For reassembly, turn both hooks up and reinstall the pin.

Quick Change Type B—Pull out the locking pins, slide the hooks down and reinstall the pins in the lower holes. For reassembly, slide the hooks up and install the pins in the top holes.



WARNING: Before removing any hoses, relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

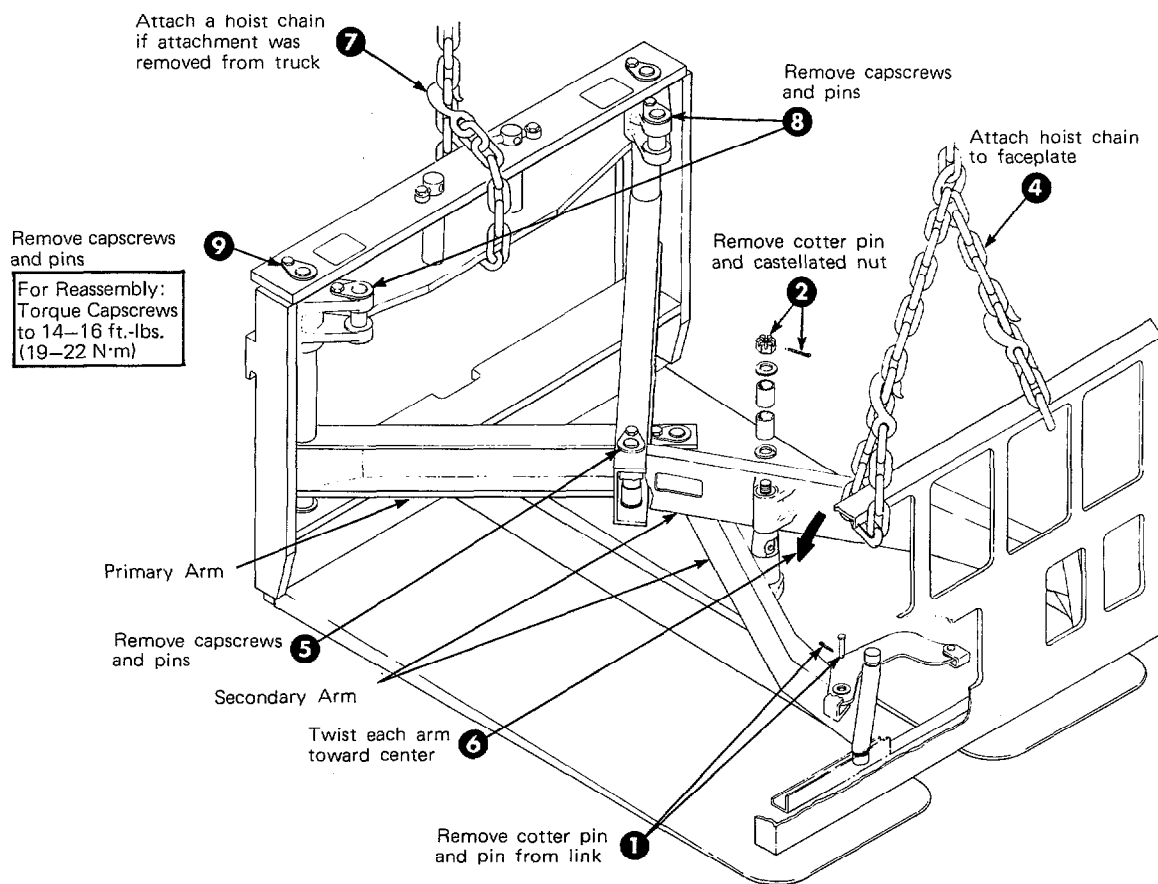
- ④ Disconnect, tag, and cap the attachment hoses at the carriage hose terminals.
- ⑤ Disconnect the sideshift cylinder, if equipped, from the truck carriage anchor bracket.
- ⑥ Disconnect the electrical connection at the truck, on solenoid mounted attachments.
- ⑦ Lower the truck carriage and back away from the attachment.
- ⑧ For reinstallation, reverse the above procedures, making sure the locating tab in the upper hook properly engages the notch in the upper truck carriage bar.



5.2 Faceplate and Pantograph Arms

5.2-1 Disassembly

- 1 Remove the cotter pin and pin from the link on the backside of the faceplate.
- 2 Remove the cotter pin and castellated nut that join the secondary arms together. Remove the pin.
- 3 Disconnect, cap, and tag the two gripper cylinder hoses at the gripper cylinder.
- 4 Attach a hoist chain to the faceplate.
- 5 Remove the capscrews and pins which hold the secondary arms to the primary arms.
- 6 Twist each secondary arm towards the faceplate center to remove them from the channels on the backside of the faceplate.
- 7 Attach a hoist to the frame assembly if the attachment was removed from the truck.
- 8 Remove the capscrews and pins from the rod end of the push/pull cylinders.
- 9 Remove the frame capscrews and pins that hold the pantograph arms to the frame.



Section 5 Service

5.2-2

Service and Reassembly

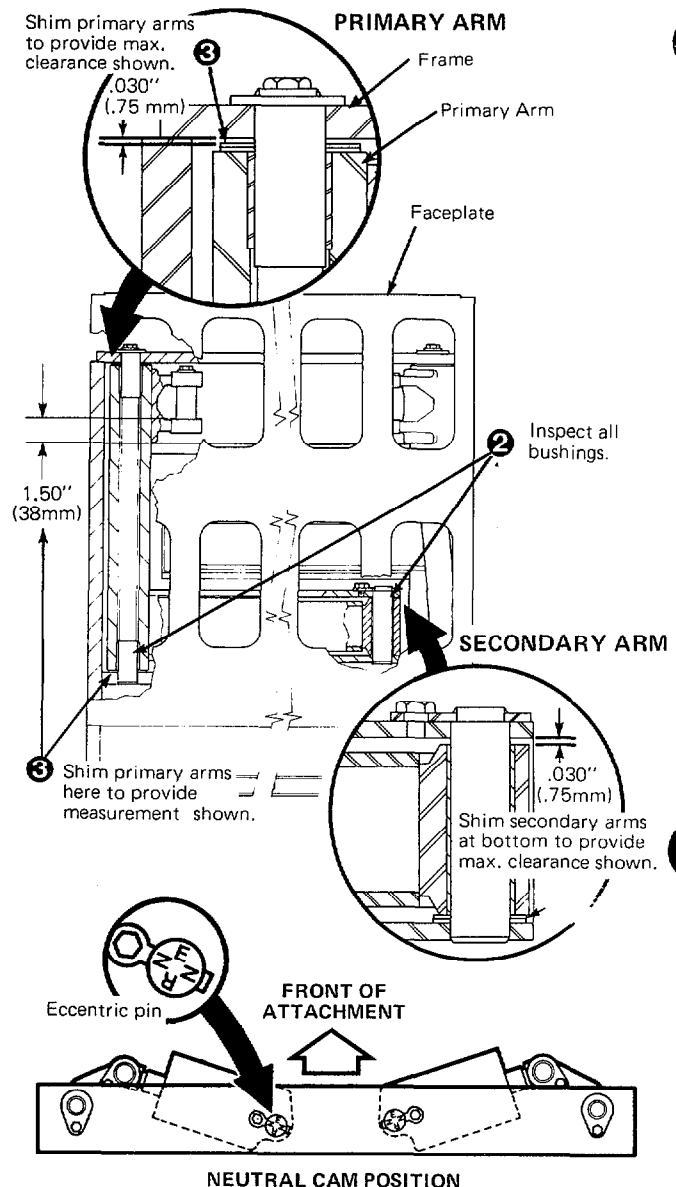
- 1 Inspect all shims, and washers and replace any that are scored or worn unevenly.
- 2 Inspect the Teflon bushings for wear. Replace the bushings if the coating is scored or worn through.
- 3 Reassembly is the reverse of the disassembly procedures except as follows:
 - Apply chassis lube to the arm pivot pins prior to reassembly.
 - Install and adjust the gripper hoses as described in Section 5.2-4.

CAUTION: Shim the primary arms at the bottom to position each clevis as shown. Shim the top of the primary arms to provide .030 inch (.75mm) maximum clearance as shown. Shim the secondary arm at the bottom to provide .030 inch (.75mm) maximum clearance as shown.

- 4 After reassembly and installation on the truck, extend and retract the faceplate 5 times to bleed excess air that may be trapped in the system. If the faceplate extends at an angle after bleeding excess air, and the cylinders are not defective (see Section 4.3-2 and 4.3-3), use the following procedure to correct the misalignment.

NOTE: If any major component (frame, faceplate pantograph arm, etc.) has been replaced, use this procedure to correct the misalignment.

- a. Fully extend the faceplate with the eccentric pin at a neutral position (the letter 'N' should be next to the capscrew).
- b. Measure the distance between the faceplate and the frame on both sides. The measurements should be equal within 1/2 inch (13mm).
If measurements differ by more than 1/2 inch (13mm) the pin opposite the longest measurement should be moved to the 'R' (Retract) position as follows.
- c. Remove the capscrew and eyebolt. Insert a metal rod and slowly turn the pin around until the 'R' is near the capscrew.
- d. Insert the eyebolt and tighten the capscrew to a torque of 35–39 ft.-lbs. (47–53 N·m).
- e. If still misaligned beyond 1/2 inch (13mm), turn pin opposite shortest measurement to 'E' (extend) position, near the capscrew.



5.2-3

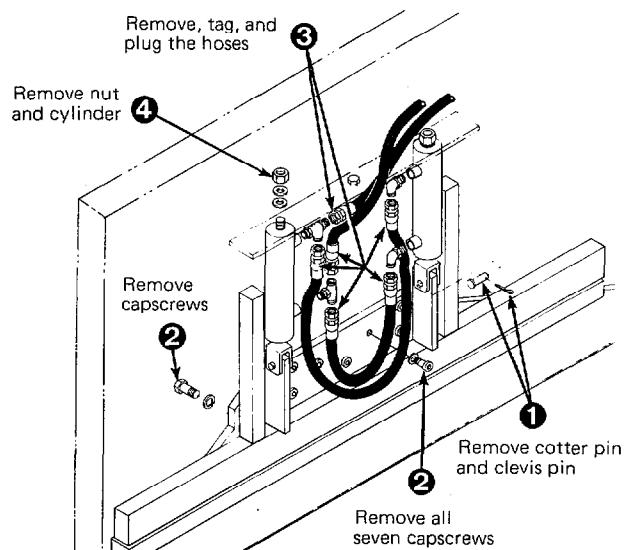
Gripper Mechanism Service

- 1 Remove the cotter pins and pins retaining the gripper cylinder rods to the gripper bar.
- 2 Remove all the capscrews holding the gripper jaw to the faceplate. The channel is now free.



WARNING: Before removing any hoses, relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

- 3 Remove, tag, and plug hoses at the gripper cylinders.
- 4 Remove the nut retaining the cylinder to the faceplate and pull out the cylinder.
- 5 Reassembly is the reverse of disassembly except as follows:
 - Tighten the cylinder anchor nuts until rigid, then back off one turn.



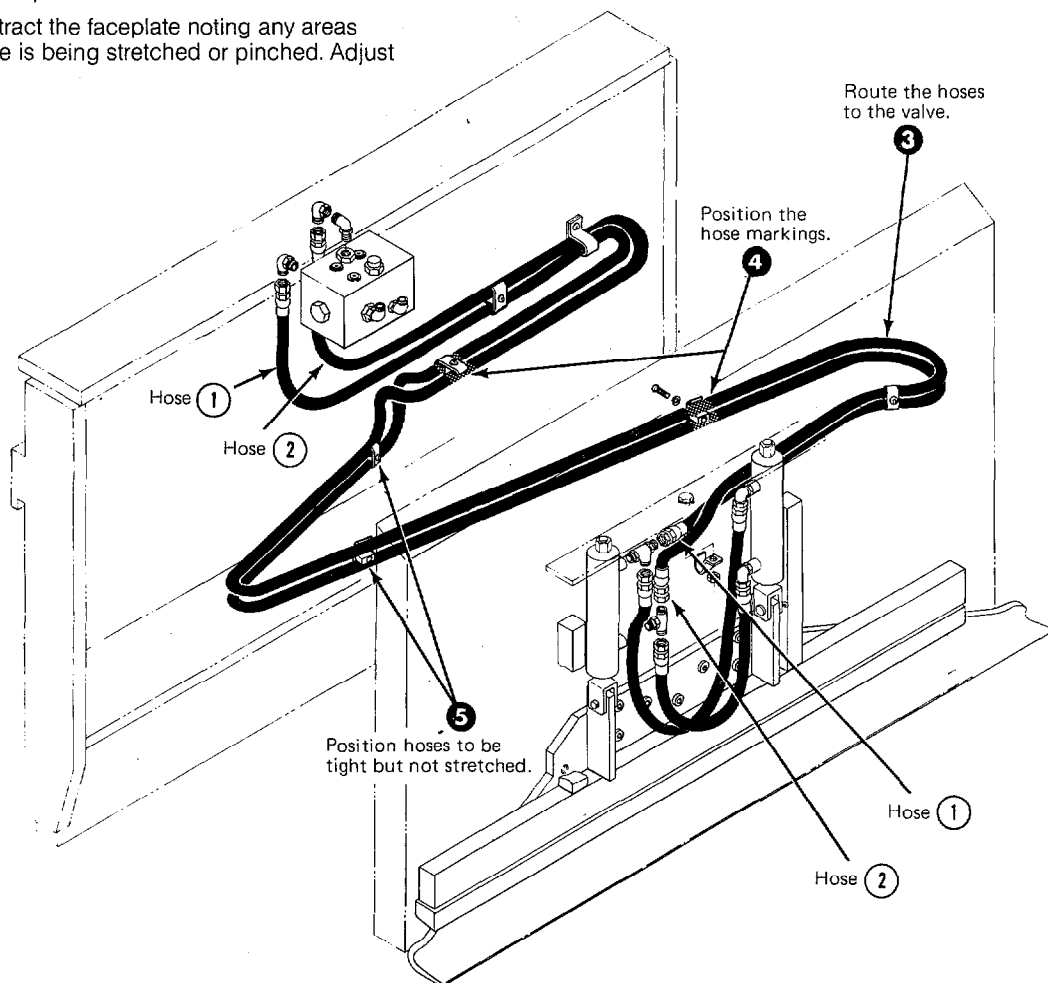
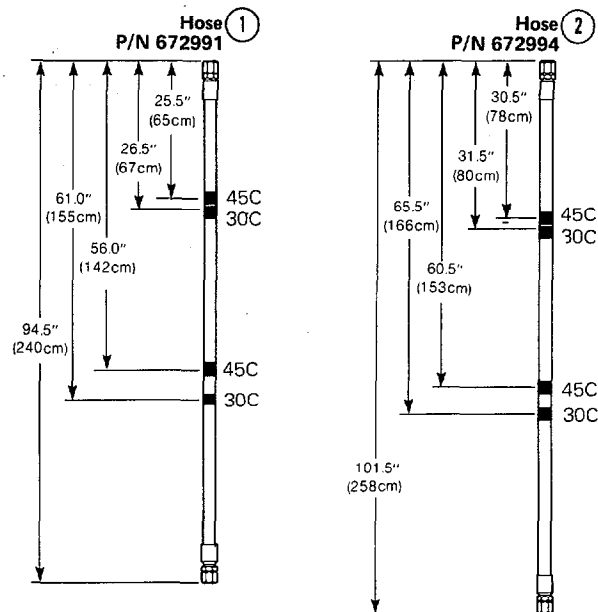
Section 5 Service

5.2-4 Gripper Hose Installation

The gripper hoses must be installed as described below for the hoses to properly track with the arms during faceplate extension and retraction. Replacement hoses should be marked as shown at right.

CAUTION: If Cascade replacement hoses are not used, the hoses must meet the following specifications:

- No. 4 Hoses with No. 4 fittings.
 - Meets SAE 100 R7 specifications.
 - Seamless nylon inner tube, wrapped with a single synthetic fiber braid.
 - Polyurethane cover.
- 1 Hose ① is marked at 25.5" (65 cm) and 26.5" (67 cm) from one end. Attach that hose end to the gripper cylinder base end tee fitting.
 - 2 Hose ② is marked at 30.5" (78 cm) and 31.5" (80.0 cm) from one end. Attach that hose end to the gripper cylinder rod end tee fitting.
 - 3 Route the pair of hoses through the secondary and primary arm to the valve as shown.
 - 4 Position hose markings at clamping locations A and D. Take slack out of hoses where attached to the arms.
 - 5 Fully extend the faceplate. Position hoses between clamps B and C to be tight but not stretched.
 - 6 Tighten the six clamp capscrews to a torque of 7–8 ft.-lbs. (10–11 N·m).
 - 7 Extend and retract the faceplate noting any areas where the hose is being stretched or pinched. Adjust as required.



5.3

Valves

5.3-1

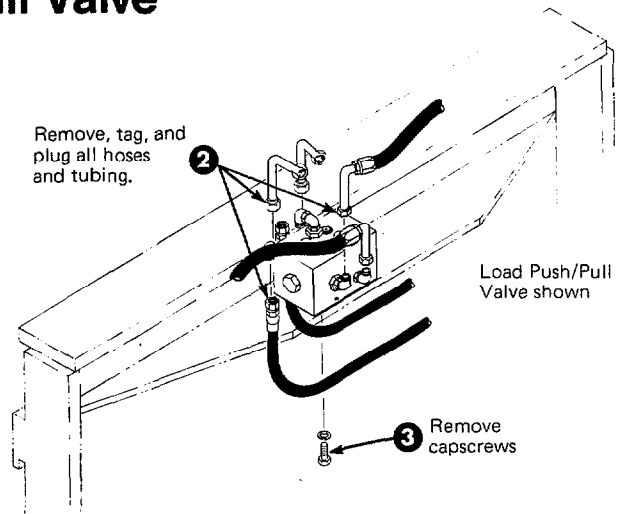
Load Push and Load Push/Pull Valve Removal and Installation

- 1 Extend the faceplate.



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

- 2 Remove, tag and plug all hoses and tubing from the valve.
- 3 Remove the two capscrews and lockwashers retaining the valve to the attachment frame. For reassembly, tighten the capscrews to a torque of 7-8 ft.-lbs. (10-11 N·m).
- 4 For reassembly, reverse the above procedures.

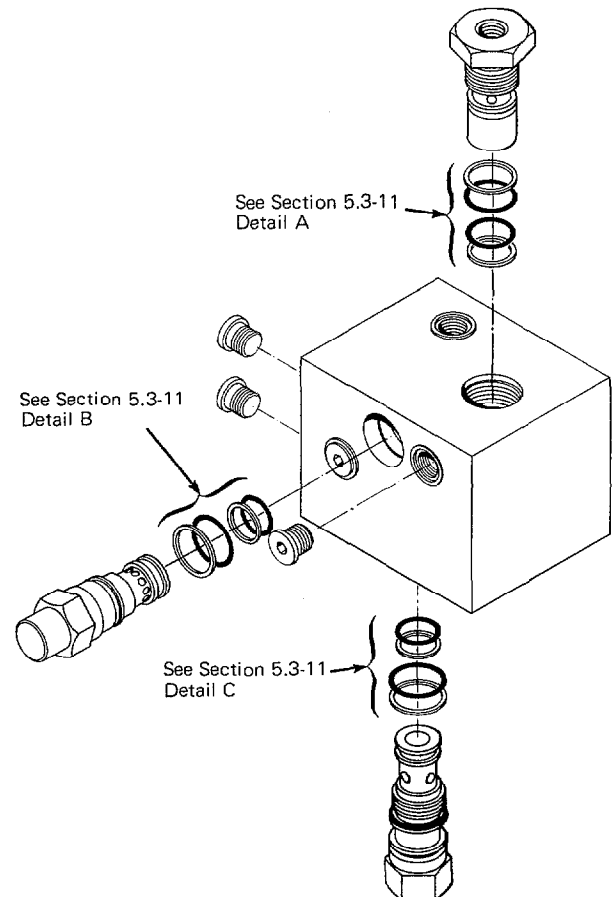


5.3-2

Load Push Valve Disassembly and Service

IMPORTANT: Service the Valve in a clean work area.

- 1 Remove the valve from the attachment as described in Section 5.3-1.
- 2 Remove fittings and plugs.
- 3 Remove the check valve cartridges.
- 4 Clean all parts with kerosene or solvent.
- 5 For reassembly, reverse the above procedures except as follows:
 - The check valve cartridge back-up rings and O-rings must be installed as shown in Section 5.3-11.
 - Lubricate the check valve cartridges with STP or petroleum jelly prior to reassembly.
 - Tighten all fittings and cartridges (except plugs) to a torque of 10-15 ft.-lbs. (13-19 N·m).

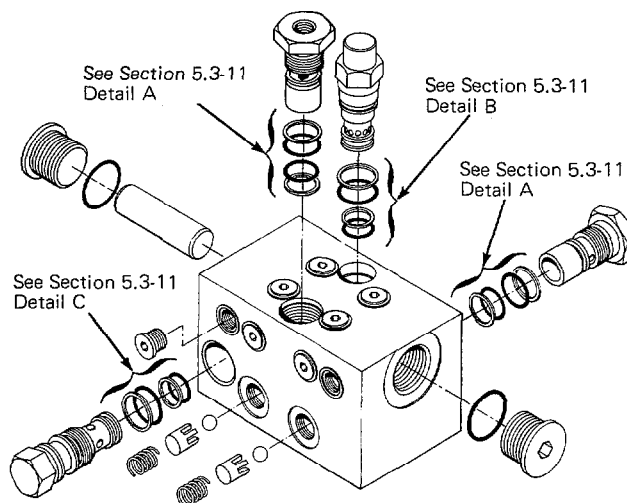


Section 5 Service

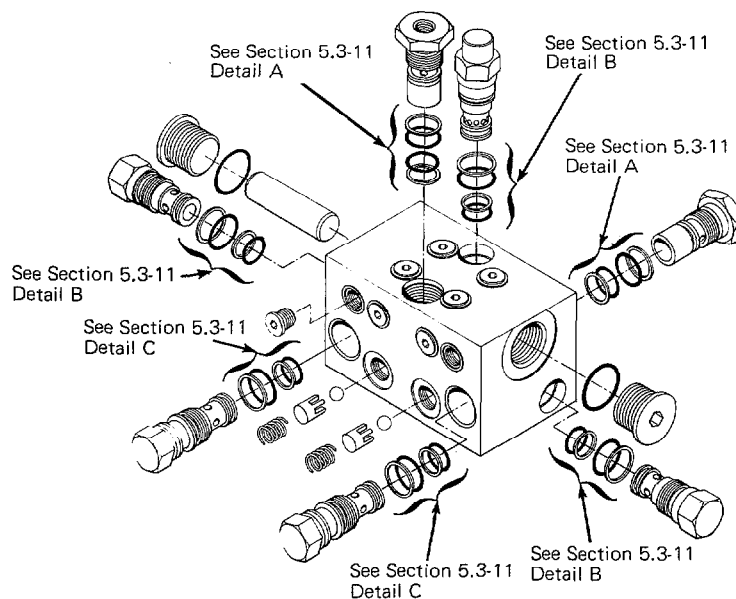
5.3-3 Load Push/Pull Valve Disassembly and Service

IMPORTANT: Service the Valve in a clean work area.

- ❶ Remove the valve from the attachment as described in Section 5.3-1.
- ❷ Remove fittings and plugs.
- ❸ Remove the check valve cartridges.
- ❹ Clean all parts with kerosene or solvent.
- ❺ For reassembly, reverse the above procedures except as follows:
 - The check valve cartridge back-up rings and O-rings must be installed as shown in Section 5.3-11.
 - Lubricate the check valve cartridges with STP or petroleum jelly prior to reassembly.
 - Tighten all fittings and cartridges (except plugs) to a torque of 10–15 ft.-lbs. (13–19 N·m).



LOAD PUSH/PULL VALVE



**LOAD PUSH/PULL VALVE
WITH SIDESHIFTING PLATENS**

Section 5 Service

5.3-4 Solenoid Valve Removal and Installation

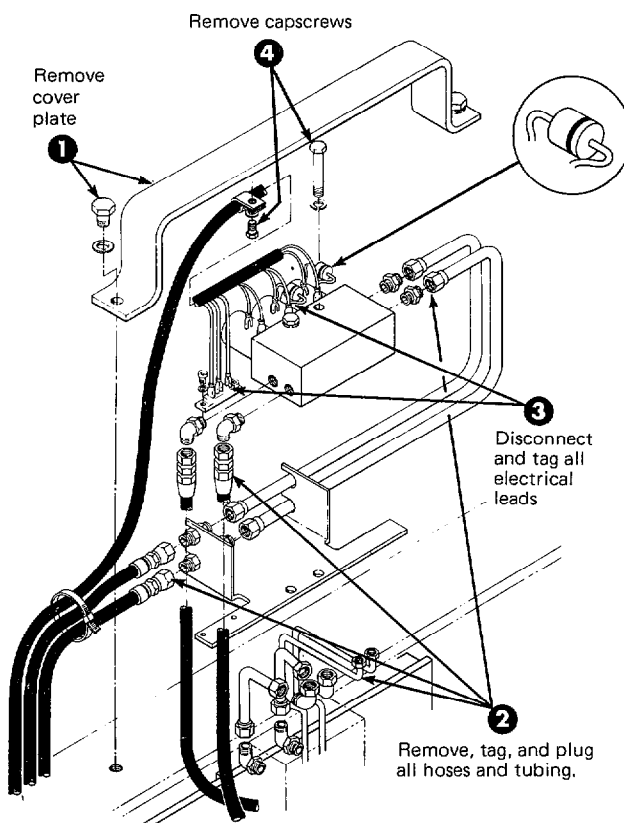
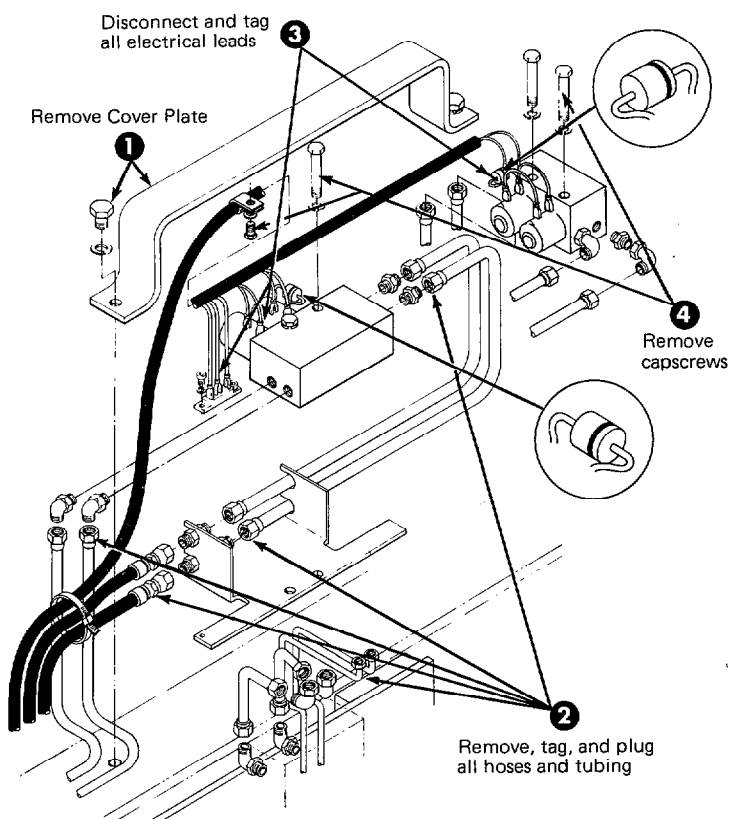
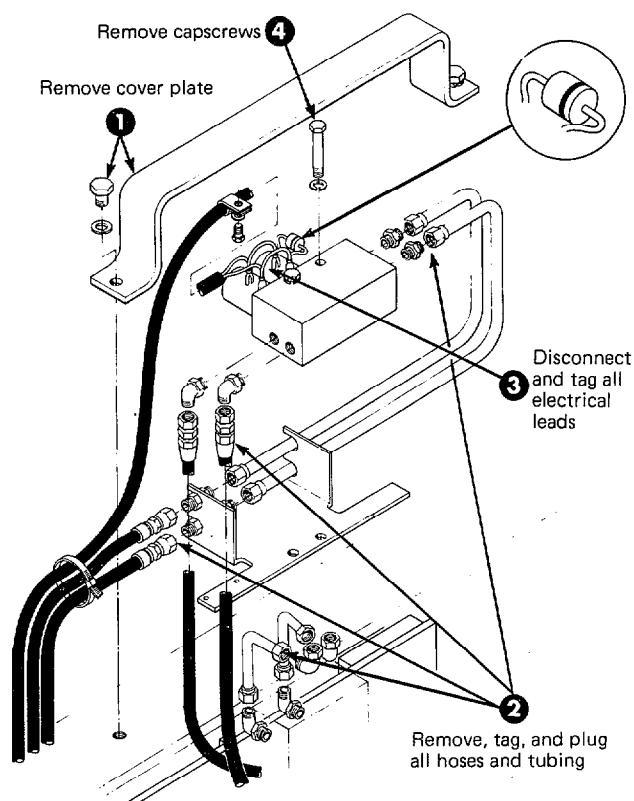
Determine which version you have (as shown) and use that illustration for valve removal and installation as follows.

- 1 Remove the cover plate as shown.



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

- 2 Remove, tag and plug all hoses or tubes at the valve.
 - 3 Disconnect all electrical leads at the solenoid coils.
- NOTE:** Mark each lead for ease in reinstallation.
- 4 Remove the capscrews retaining the valve to the frame.
 - 5 Installation is a reverse of removal except as follows:
- See Section 2.3-2 step 11 for wiring diagrams.



Section 5 Service

5.3-5 Solenoid Valve Disassembly and Service

NOTE: The Solenoid Valve you are servicing may differ from the assemblies shown. Seal placement and coil assembly is typical for all valves.

IMPORTANT: Service the Solenoid Valve in a clean work area.

① Remove the valve from the attachment as described in Section 5.3-4.

② Remove fittings and plugs.

③ Remove the solenoid coils.

CAUTION: Always replace the coils with a coil of the same voltage.

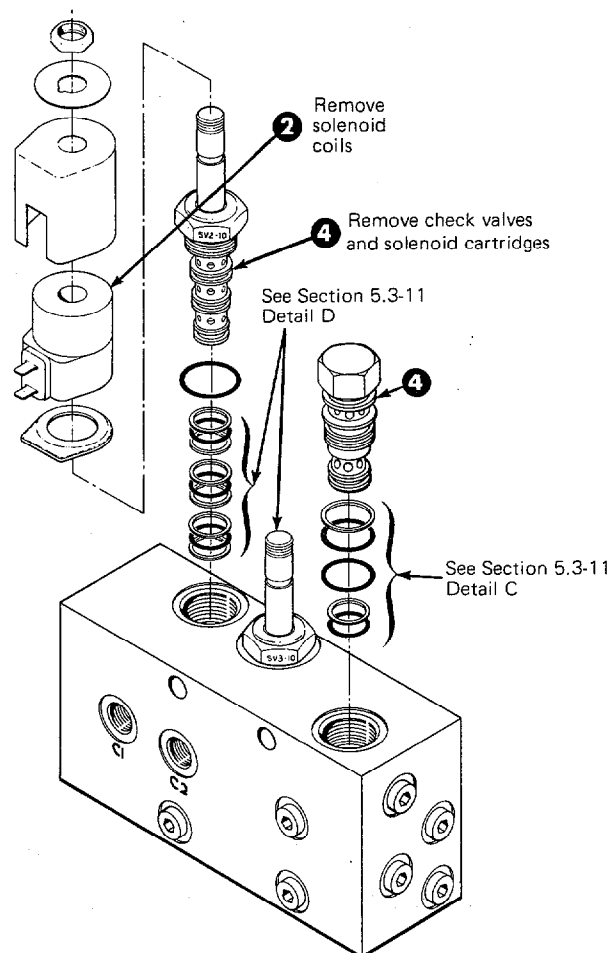
④ Remove the check valve and solenoid cartridges.

⑤ Remove the high volume bypass components if equipped.

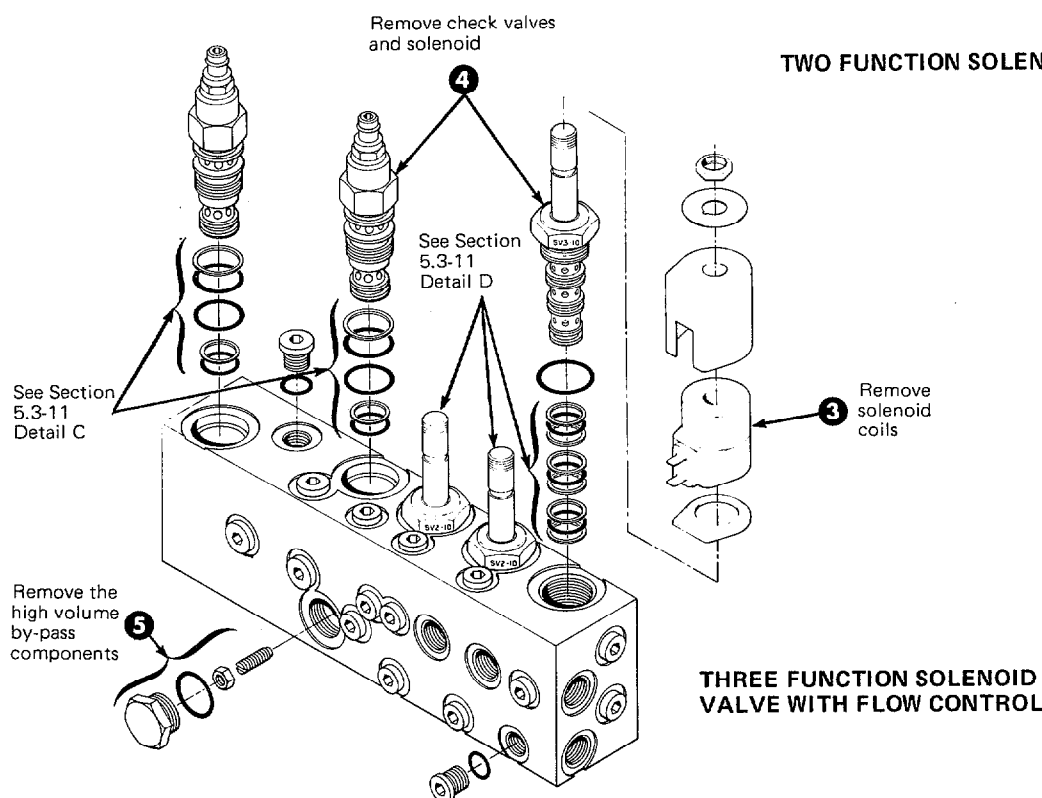
⑥ Clean all parts with kerosene or solvent.

⑦ For reassembly, reverse the above procedures except as follows:

- The check valve and solenoid cartridge back-up rings and O-rings must be installed as shown in Section 5.3-11.
- Lubricate the check valve and solenoid cartridges with STP or petroleum jelly prior to reassembly.
- Tight all fittings and cartridges (except plugs) to a torque of 10–15 ft.-lbs. (13–19 N-m).
- Adjust the high volume bypass setscrew as described in Section 5.3-8.



TWO FUNCTION SOLENOID VALVE – SHEET SAV®



THREE FUNCTION SOLENOID VALVE WITH FLOW CONTROL

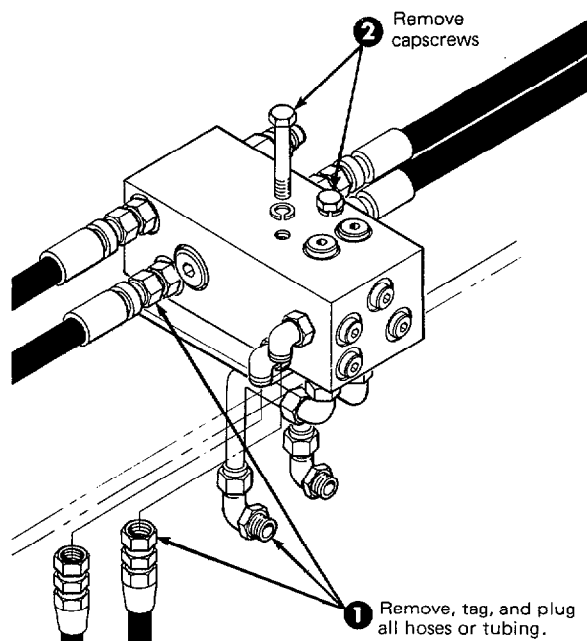
Section 5 Service

5.3-6 Flow Control Manifold Removal and Installation



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

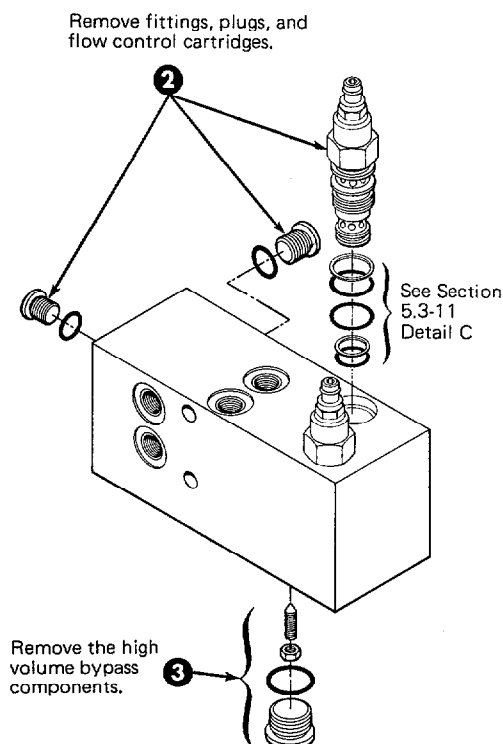
- 1 Remove, tag and plug all hoses and tubes to the manifold.
- 2 Remove the capscrews fastening the manifold to the frame.
- 3 Installation is a reverse of above procedures.



5.3-7 Flow Control Manifold Disassembly and Service

IMPORTANT: Service the Manifold in a clean work area.

- 1 Remove the manifold from the attachment as described in Section 5.3-6.
- 2 Remove the fittings, plugs and flow control cartridges.
- 3 Remove the high volume bypass components.
- 4 Clean all parts with kerosene or solvent.
- 5 For reassembly, reverse the above procedures except as follows:
 - The flow control cartridge back-up rings and O-rings must be installed as shown in Section 5.3-11.
 - Lubricate the flow control cartridges with STP or petroleum jelly prior to reassembly.
 - Tighten all fittings and cartridges (except plugs) to a torque of 10–15 ft.-lbs. (13–19 N·m).
 - Adjust the high volume bypass setscrew as described in Section 5.3-8.

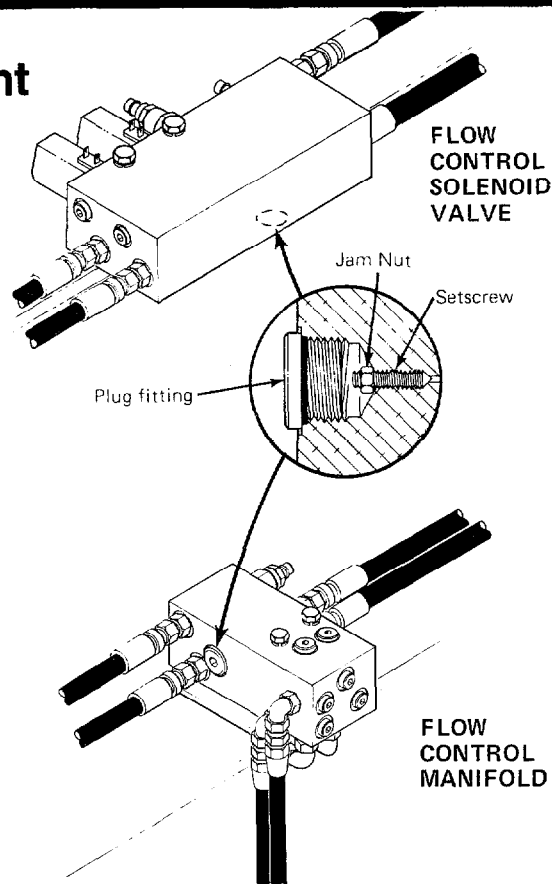


5.3-8 High Volume Bypass Adjustment

The flow control manifold and solenoid valve have a bypass orifice for use with high volume truck applications over 16 GPM (60L/min). The bypass can be adjusted to reduce truck engine stall during actuation of the attachment.

NOTE: The bypass orifice setscrew is adjusted closed at the factory.

- 1 Remove the plug fitting.
- 2 Turn the setscrew counterclockwise one turn with a screwdriver. Tighten the jam nut. Replace the plug fitting.
- 3 Start the truck and actuate the attachment.
 - If the truck continues to stall, repeat steps 1 through 3.
 - If the truck does not stall, adjustment is complete.



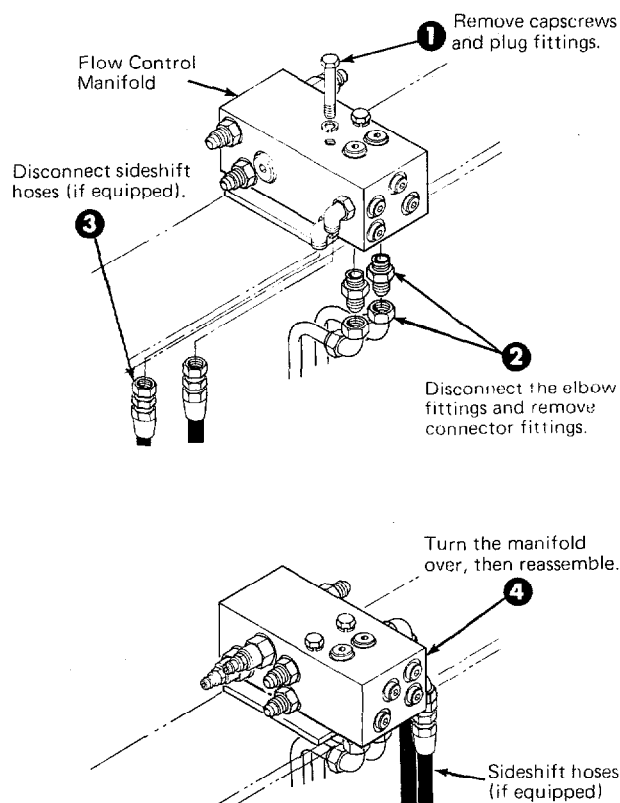
5.3-9 Flow Control Manifold Port Reversal

The flow control manifold can be turned over to reverse the location of the Sideshift and Push/Pull ports.



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

- 1 Remove the capscrews fastening the manifold to the frame. Remove the two plug fittings from the top of the manifold.
- 2 Disconnect the elbow fittings from the connector fittings. Remove the connector fittings.
- 3 Disconnect the sideshift hoses from the elbow fittings if equipped.
- 4 Turn the manifold over, then reassemble.



Section 5 Service

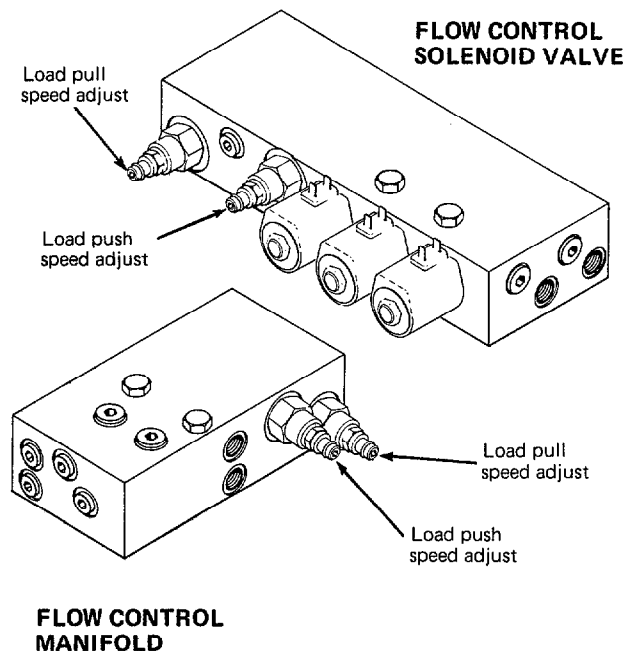
5.3-10 Push/Pull Speed Adjustment

The optional flow control manifold and solenoid valve have a separate speed adjustment range of $\pm 30\%$ for the Load Push and Load Pull functions.

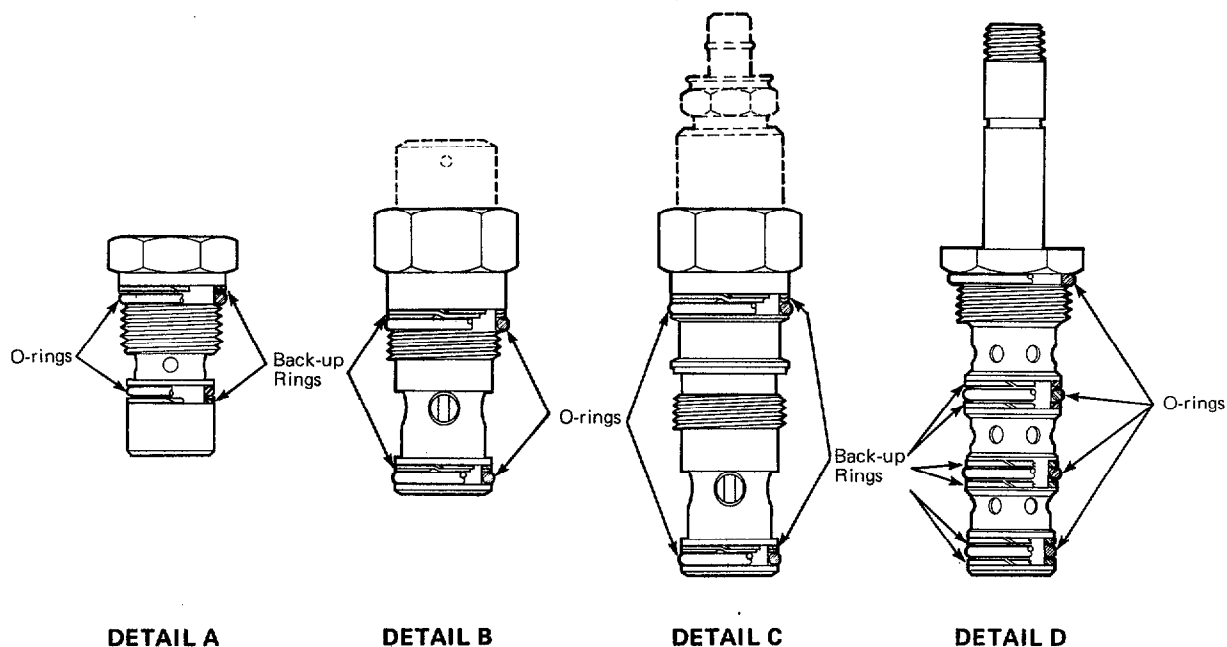
- 1 Loosen the lock nut on each adjustable valve cartridge.
- 2 Turn the adjustment screw, with a hex wrench, clockwise to increase the speed or counterclockwise to decrease the speed. The adjustment range is $\pm 30\%$. Adjust as necessary while operating the attachment.

Do not bottom out the adjustment. Operating pressure will be lost.

- 3 Tighten the lock nuts after final adjustment.



5.3-11 Check Valve Cartridge Seal Details



5.4 Cylinders

5.4-1 Gripper Cylinder Removal and Installation

- ① See Section 5.2-3 to remove the cylinder.
- ② Reverse the procedures to install the cylinder.

5.4-2 Push/Pull Cylinder Removal and Installation

CAUTION: If the attachment is equipped with adjustable retainer cylinders as shown below, the retainers must be adjusted prior to hose installation and attachment operation. Service procedures are similar to standard cylinders. See step 5 for adjustment procedures.

- ① Remove, tag and plug the hoses at the push/pull cylinder.
- ② Remove the capscrews and pins retaining the rod ends.
- NOTE:** The cylinder may be swung out and serviced at this time. To completely remove the cylinder proceed.
- ③ Remove the capscrews, eyebolt and pin holding the cylinder to the frame. (Note position of eccentric pin for reassembly.)
- ④ Installation is a reverse of the above procedures.

⑤ ADJUSTABLE RETAINER CYLINDERS

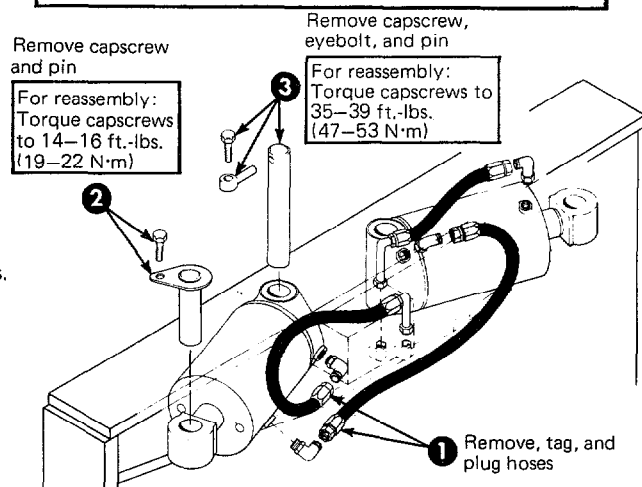
- Loosen the setscrew in the jam nut ring. Back off the jam nut ring to the end of the inner retainer.
- Adjust inner retainer out to the end of its travel. The threads will be exposed about 1 inch (25cm).
- Manually extend the faceplate to set square with the platen tips at the desired extension.
- Adjust the inner retainer inward to contact the cylinder piston. The faceplate must remain square with the platen tips.
- Tighten the jam nut ring to a torque of 75–100 ft.-lbs. (98–130 N·m). Tighten the setscrew to a torque of 16–18 ft.-lbs. (20–24 N·m).



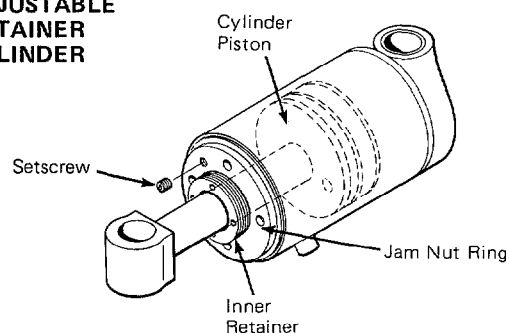
WARNING: Before removing any tubes, relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.



WARNING: Remove push/pull cylinder rod end pins to avoid possible injury due to inadvertent faceplate retraction.



ADJUSTABLE RETAINER CYLINDER

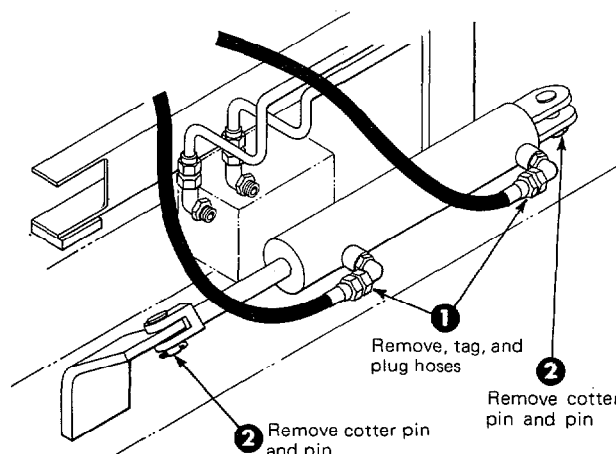


5.4-3 Sideshift Cylinder Removal and Installation

- ① Remove, tag and plug the hoses at the sideshift cylinder.
- ② Remove the cotter pins and pins at the rod and base ends and lift out the cylinder.
- ③ Installation is a reverse of the above procedures.

5.4-4 Sheet Retainer Cylinder Removal and Installation

- ① Use same steps as 5.4-3
- ② For service see 5.4-9.

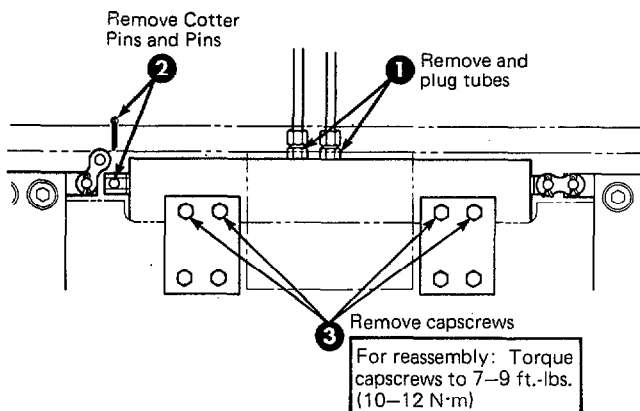


Section 5 Service

5.4-5 Adjustable Platen Cylinder Removal and Installation

Remove the attachment from the truck according to the procedures in section 5.1. Extend the faceplate before removal.

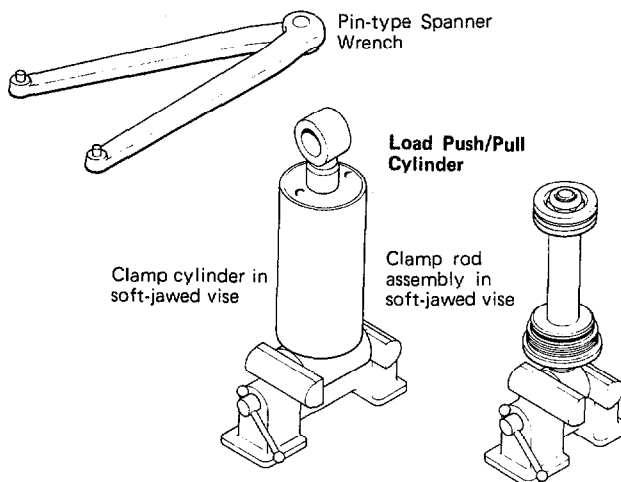
- 1 Remove and plug the tubes at the cylinder.
- 2 Remove the cotter pins and pins at both ends of the cylinder.
- 3 Remove the capscrews retaining the cylinder to the frame and lift out the cylinder.
- 4 Installation is a reverse of removal.



5.4-6 General Cylinder Service Procedures

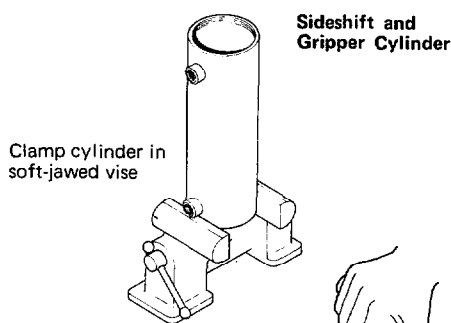
Cylinder Disassembly

- Use a pin type spanner wrench to remove push/pull cylinder retainer.
- When servicing a cylinder, clamp it in a soft-jawed vise as shown. **Never clamp the cylinder shell or the cylinder rod sealing area in a vise.**
- To remove the seal from a piston or a retainer, put the piston or retainer in a soft-jawed vise. Pry the seal up with a blunt tool such as a screwdriver, then cut the seal to remove it. **Be careful not to scratch the seal groove.**



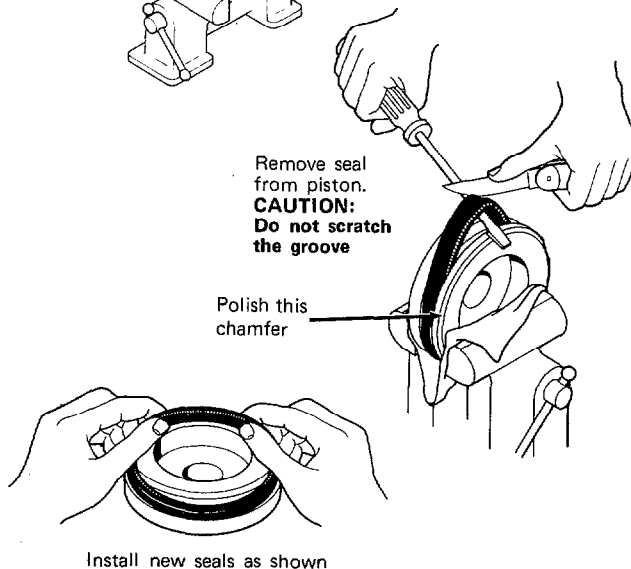
Cylinder Inspection

- Inspect the rod, piston, and retainer for nicks or burrs. If deeply gouged, replace the part. Minor nicks and burrs can be removed with an emery cloth.
- NOTE:** A minor nick is one that will not cause a bypass of oil when the cylinder is operating.
- Inspect the inside of the cylinder shell and remove any minor nicks and burrs (see Note, above) with a butterfly hone. Replace the cylinder shell if it is deeply gouged.



Cylinder Assembly

- Lubricate all new seals with STP before installing.
 - To install a new seal on a piston or retainer, hook one side of the seal in the groove and push it over the piston or retainer.
- NOTE:** Polishing the chamfer angle will allow the seal to slide into the groove much easier.
- Carefully note the direction of U-cup seals. If they are installed backwards, the seals will not seal properly. Refer to the illustration of the cylinder you are servicing on pages 51 and 52.
 - Always reassemble the rod assembly by sliding the retainer on first, then the piston assembly. Install and torque the piston retaining nut before sliding the rod assembly back into the shell.
 - When reassembling a cylinder, always observe all torque values as shown in the appropriate illustration.

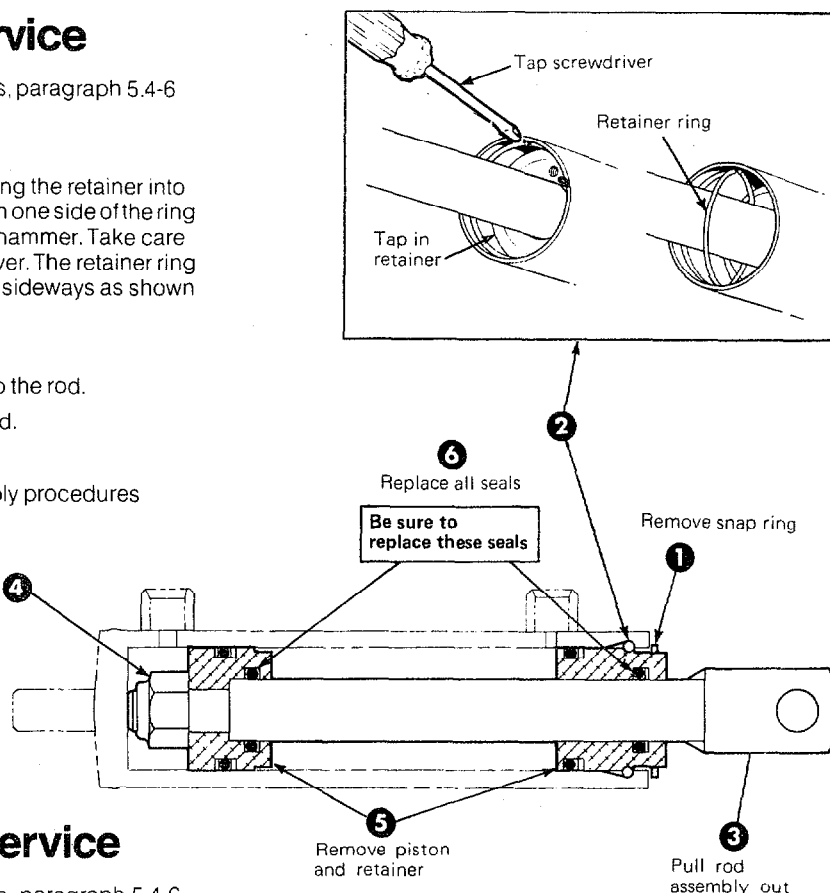


5.4-7 Gripper Cylinder Service

Read the General Service Procedures, paragraph 5.4-6 before proceeding.

- 1 Remove the snap ring.
- 2 Remove the retainer ring by first tapping the retainer into shell bore. Then place a screwdriver on one side of the ring and tap the screwdriver gently with a hammer. Take care not to gouge shell bore with screwdriver. The retainer ring should compress at the split and turn sideways as shown at right. Grasp the ring and pull it out.
- 3 Pull the rod assembly out of the shell.
- 4 Remove the nut securing the piston to the rod.
- 5 Slide the piston and retainer off the rod.
- 6 Remove and replace all seals.
- 7 Perform the inspection and reassembly procedures listed in paragraph 5.4-6.

Remove the nut
For reassembly: Torque
to 40–45 ft.-lbs. (54–61 N·m)



5.4-8 Push/Pull Cylinder Service

Read the General Service Procedures, paragraph 5.4-6 before proceeding.

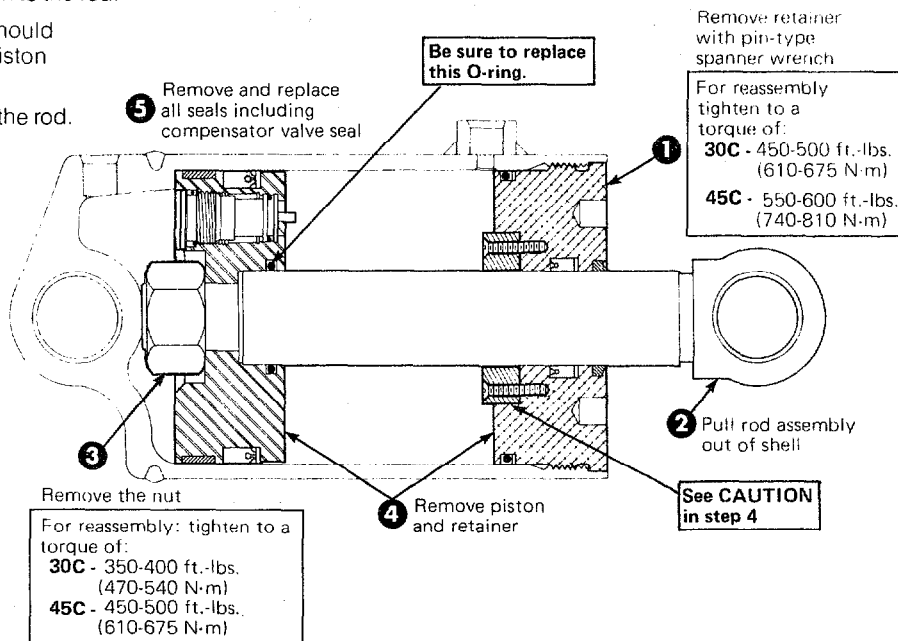
- 1 Use a pin type spanner wrench to remove the retainer.
- 2 Pull the rod assembly out of the shell.
- 3 Remove the nut securing the piston to the rod.

CAUTION: The 45C piston nut should be removed and replaced with piston nut 674002.

- 4 Slide the piston and retainer from the rod.

CAUTION: On units equipped with platens shorter than 48 inches (122 cm), split spacers and shims must be installed in the push/pull cylinders. If your unit was factory ordered with platens shorter than 48 inches (122 cm), the spacers and shims are factory installed. If you are installing the shorter platens, the spacers and shims are supplied with the platens for field installation.

To install the spacers and shims you need only remove the retainer and slip the shims and split spacers into place. Torque the capscrews to 9 ft.-lbs. (12 N·m). Reinstall the retainer.



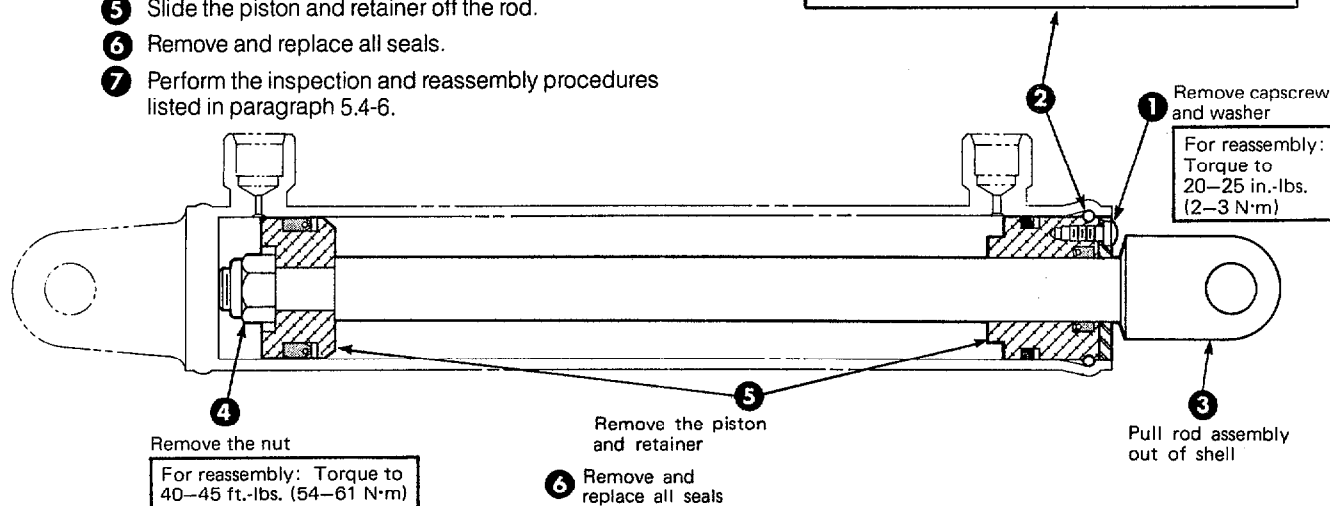
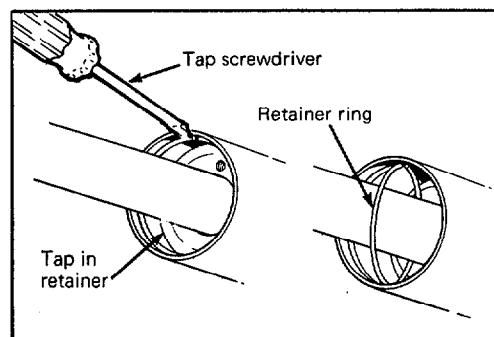
- 5 Remove and replace all seals including the compensator valve seals.
- 6 Perform the inspection and reassembly procedures in paragraph 5.4-6.

Section 5 Service

5.4-9 Sideshift Cylinder Service

Read the General Service Procedures, paragraph 5.4-6 before proceeding.

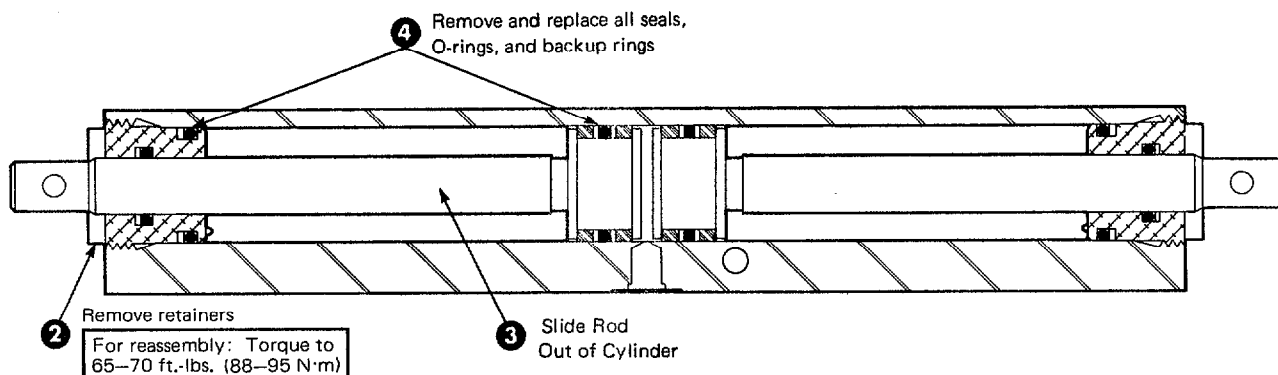
- 1 Remove the capscrews securing the washer to the retainer. Partially extend rod (approx. 4") and slide washer away from retainer.
- 2 Remove the retainer ring by first tapping the retainer in. Then place a screwdriver on one side of the ring near the split and tap the screwdriver gently with a hammer. The retainer ring should compress at the split and turn sideways. Grasp the ring and pull it out.
- 3 Pull the rod assembly out of the shell.
- 4 Remove the nut securing the piston to the rod.
- 5 Slide the piston and retainer off the rod.
- 6 Remove and replace all seals.
- 7 Perform the inspection and reassembly procedures listed in paragraph 5.4-6.



5.4-10 Adjustable Platen Cylinder Service

Read the General Service Procedures, paragraph 5.4-6 before proceeding.

- 1 Remove the cotter pin, pin and link at both ends of the cylinder.
- 2 Use wrench to unthread the retainers.
- 3 Pull the rod assemblies out of the shell.
- 4 Remove and replace all seals.
- 5 Perform the inspection and reassembly procedures listed in paragraph 5.4-6.



5.5 Platens

5.5-1 Removal and Installation (with unit mounted on truck)

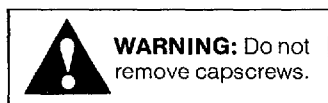
CAUTION: If you are removing your 48 inch (122 cm) platens to install shorter platens, you must also install the spacers and shims (supplied with the platens) in the push/pull cylinders. See Section 5.4-8 for spacer installation procedures.

- 1 Extend the faceplate fully.
- 2 With the platens flat on the floor remove the capscrews securing the hooks to the platens.
- 3 Back the truck and attachment away from the platens.
- 4 To install, reverse the above procedures. Tighten the capscrews to a torque of 200–210 ft.-lbs. (270–285 N·m).

5.5-2 Platen Shims

NOTE: Platen tips should align within 1/4" (6mm). With faceplate extended 36 inches (91 cm) from frame, the platens should make contact with the gripper jaw. Add shims to lower the platen tips or remove shims to raise platen tips.

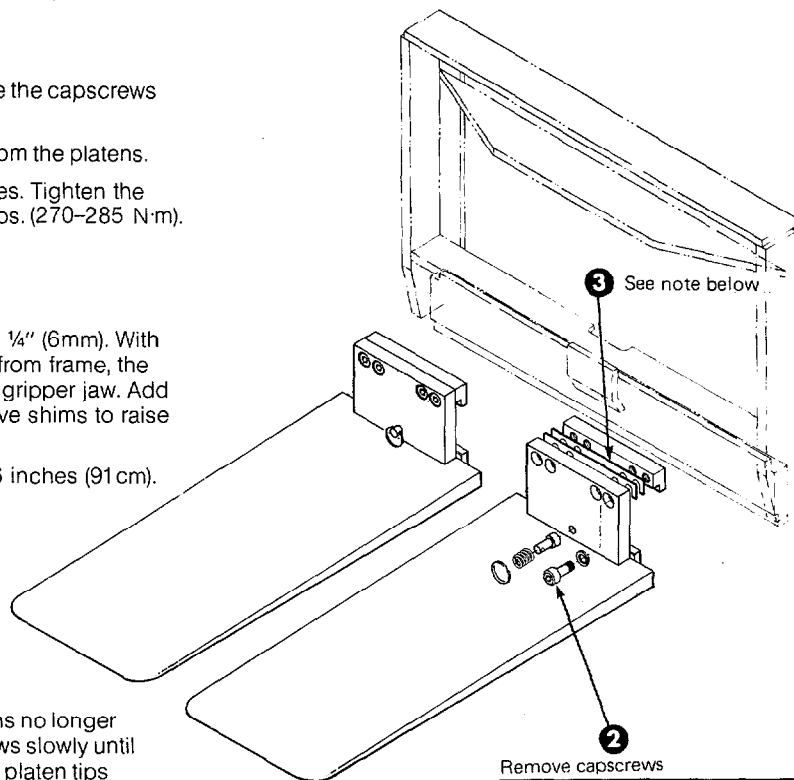
- 1 Extend the faceplate approximately 36 inches (91 cm).
- 2 With the platens off the floor a few inches, slowly loosen the platen capscrews.



- 3 Back the capscrews out until the platens no longer touch the gripper jaw. Tighten capscrews slowly until the platens contact the gripper jaw and platen tips are aligned. Either add or remove shims an appropriate amount to maintain platens in this position.

NOTE: To add or remove shims the platens must be removed from the attachment.

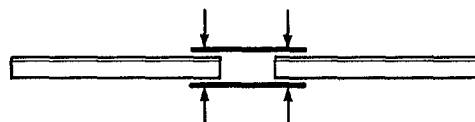
- 4 Set platens flat on floor.
- 5 Disengage platen lock pin spring clips.
- 6 Remove platen retaining capscrews.
- 7 Tilt truck mast back. Raise attachment about 1/2" and back away from platens only enough to allow space to insert/remove shims.
- 8 Install capscrews into platens, add or remove appropriate amount of shims. (If needed, apply a piece of strong tape to hold shims in place).
- 9 Return truck/attachment to original position, engage platens and return the mast to upright position.
- 10 Reinstall platen capscrews. Tighten to a torque of 200–210 ft.-lbs. (270–285 N·m).
- 11 Engage platen lock pins.



Remove capscrews

WARNING: Torque to 200–210 ft.-lbs. (270–285 N·m)

- 3 Platen tips must be even or within 1/4" (6mm) of each other. Add shims to raise platen tips. Remove shims to lower tips.



5.5-3 Inspection

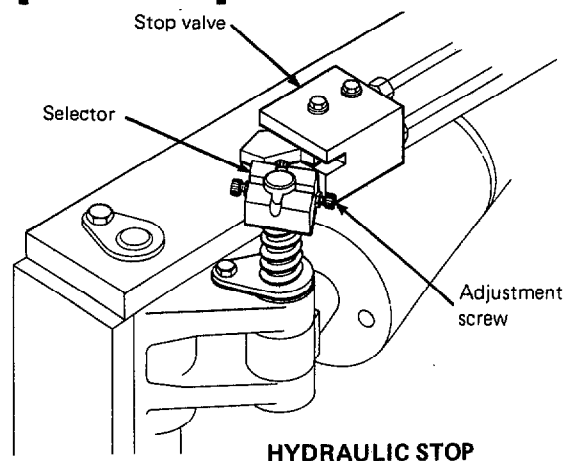
- 1 Check the platen tips for nicks. Flatten out nicks with a hammer and smooth the edges with a file or grinder.
- 2 An application of wax or paraffin on the top of the platens will reduce friction between the platens and slip sheets. Use a piece of steel wool to remove excess wax.

Section 5 Service

5.6 Hydraulic Faceplate Stop Group

5.6-1 Adjustment

- 1 Extend faceplate to expose stop mechanism. Depress selector and turn to corresponding number (stamped in selector) of inches (0, 3, 6 or 9) faceplate is to be positioned to for full back travel. Number selected should be turned so corresponding adjusting capscrew will contact lever on stop valve.
- 2 A more precise faceplate stop position may be attained by adjusting the capscrews on the selector. Loosen the lock nut and turn the capscrew (counter-clockwise to decrease the dimension of faceplate to platen tips, clockwise to increase the dimension of faceplate to platen tips).



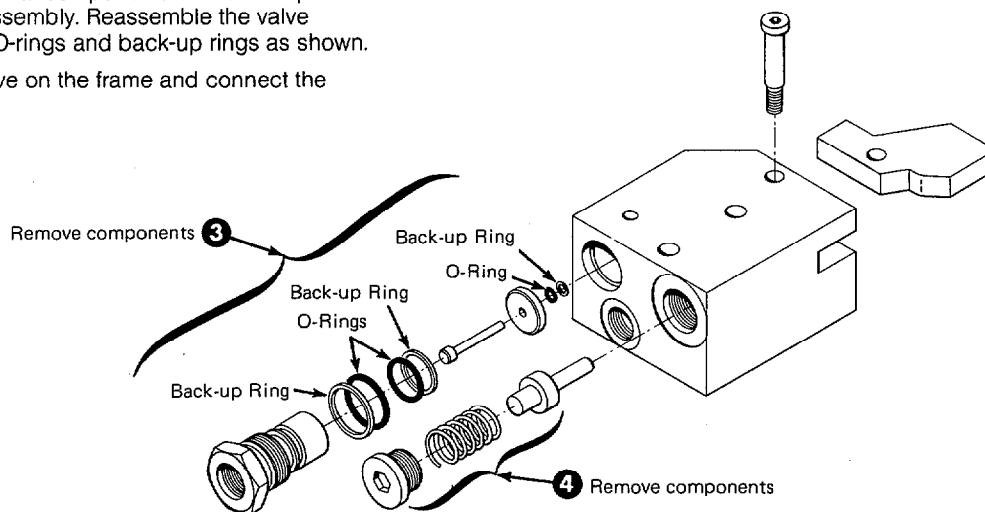
5.6-2 Stop Valve Service

- 1 Extend the faceplate to gain access to the stop valve.



WARNING: Before removing any hoses relieve pressure in the hydraulic system. Turn the truck off, then open the truck auxiliary control valve(s) several times in both directions.

- 2 Disconnect the hydraulic tubes from the stop valve. Remove the capscrews fastening the stop valve to frame.
 - 3 Remove the cartridge, plunger and spacer. Remove the small O-ring and back-up ring using an O-ring removal tool.
- CAUTION:** Do not damage inner valve surfaces.
- 4 Remove the plug, spring and plunger.
 - 5 Wash the valve body with cleaning solvent and blow dry.
 - 6 Lubricate all internal components with STP or petroleum jelly prior to reassembly. Reassemble the valve positioning the O-rings and back-up rings as shown.
 - 7 Reinstall the valve on the frame and connect the hydraulic tubes.



5.7

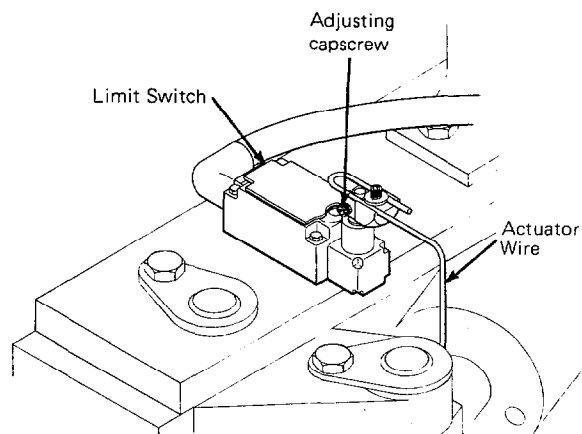
Electrical Faceplate Stop Group

5.7-1

Adjustment

- 1 Extend faceplate to expose stop switch. Adjustment is made by loosening the capscrew and rotating the actuator wire. Rotate actuator counter-clockwise to decrease faceplate to platen tip dimension. Rotate clockwise to increase the faceplate to platen tip dimension.

NOTE: When the arm contacts the actuator wire, the normally closed switch opens to stop faceplate travel. Wiring is connected to terminals 1 and 2 for normally closed operation.



ELECTRICAL STOP

Section 5 Service

5.8 Sheet Retainer Mechanism

5.8-1 Removal and Installation

- 1 Extend the faceplate and actuate sheet release mode. This will raise the sheet retainer bar off platens.



WARNING: To remove platens, prop sheet retainer bar in raised position and turn truck **OFF** to avoid possible injury

- 2 Set attachment and platens on floor. Remove platen capscrews, raise attachment to clear platens, back attachment away and set on floor or pallet.
- 3 Actuate sheet retain mode to lower sheet retainer bar to floor or pallet.
- 4 Remove attachment from truck. See Section 5.1.



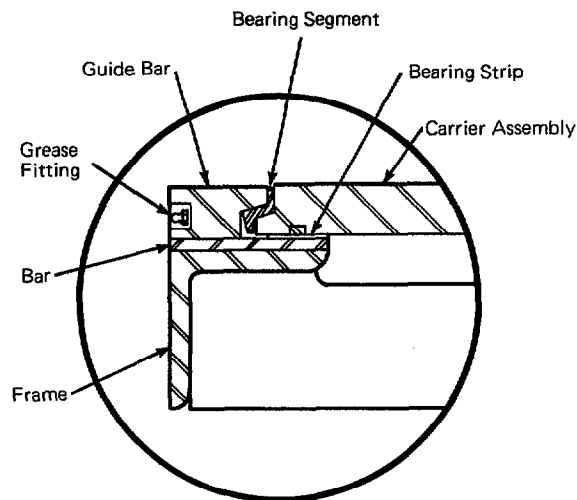
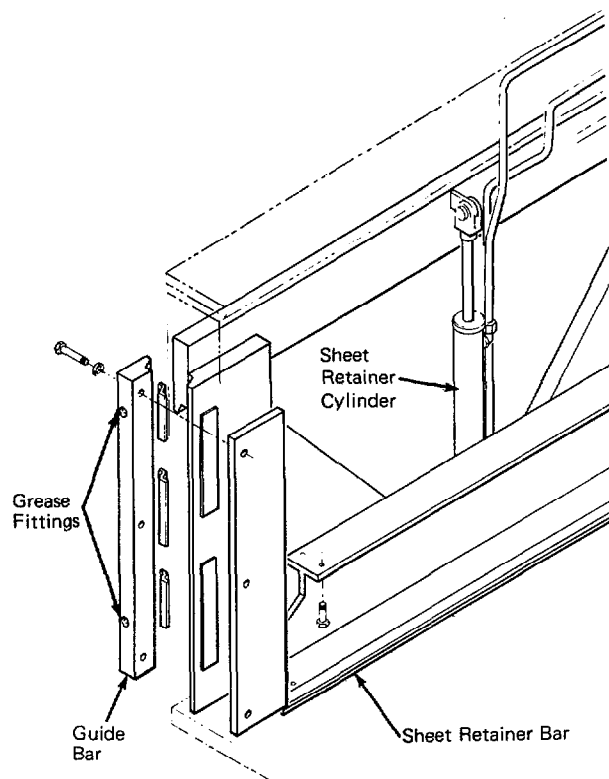
WARNING: Before removing any hoses, relieve pressure that might be present in the hydraulic system. With the truck off, open the truck auxiliary control valve(s) several times in both directions.

- 5 Remove sheet retainer cylinder. Remove the cotter pins and both clevis pins. Remove the tubes to cylinder and cap fittings.



WARNING: Carrier assembly is heavy and should be removed and or replaced with care.

- 6 Remove carrier assembly. See top view illustration at right. Remove 6 capscrews from guide bars. Make sure sideshift cylinder has been disconnected from carrier.
- 7 Replace damaged or worn bearing segments or bearing strips. Lube bearings prior to assembly.
- 8 For reassembly, reverse the above procedures except as follows:
 - Tighten the guide bar capscrews to a torque of 56–60 ft.-lbs. (77–81 N·m).
 - Tighten the Sheet Retainer Bar capscrews to a torque of 23–25 ft.-lbs. (31–34 N·m).



TOP VIEW
(Assembled Frame/Carrier Assy.)

6 Specifications

6.1-1 Hydraulics

Hydraulic Specifications	30C	45C
Pressure – Recommended	2000 (140 bar)	2000 (140 bar)
Maximum	2300 (160 bar)	2300 (160 bar)
Flow – Minimum^①	3 GPM (11L/min)	3 GPM (11L/min)
Recommended	9 GPM (34L/min)	6 GPM (22L/min)
Maximum^②	15 GPM (56L/min)	10 GPM (37L/min)
Supply Hose and Fitting Size	No. 6 9/32in. (7mm)	No. 6 9/32in. (7mm)
Minimum Orifice Size		

① Flow less than minimum will result in slow faceplate speed. 2659w-156/5

② Flow greater than maximum can result in excessive faceplate speed, reduced system performance and short hydraulic system life.

Hydraulic Oil – Cascade attachments are compatible with SAE 10W petroleum base oil per Mil. Spec. MIL-O-5606 or MIL-O-2104B.

Use of synthetic or aqueous base hydraulic oil is not recommended. Contact Cascade if fire resistant hydraulic oil must be used.

In order to conform to industry standard practice, the hoses should be connected to the truck auxiliary valve as indicated by the chart.

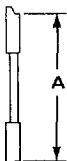
Function, in sequence of location to the operator.	Attachment Movement	Motion of the operator's hand when actuating the truck auxiliary control handle while facing the load.
Sideshift	Sideshift Right	Rearward or Up
	Sideshift Left	Forward or Down
Push/Pull	Pull (rearward)	Rearward or Up
	Push (forward)	Forward or Down
Adjust Platens	Platens In	Rearward or Up
	Platens Out	Forward or Down
Sheet Retain	Retain	Rearward or Up
	Release	Forward or Down
Sideshift Platens	Sideshift Right	Rearward or Up
	Sideshift Left	Forward or Down

2659x

6.1-2 Truck Carriage

Truck carriage must conform to ISO dimensional standard 2328, equivalent to Industrial Truck Association (ITA) dimensions shown.

Make sure the truck carriage is clean and the notches are undamaged.

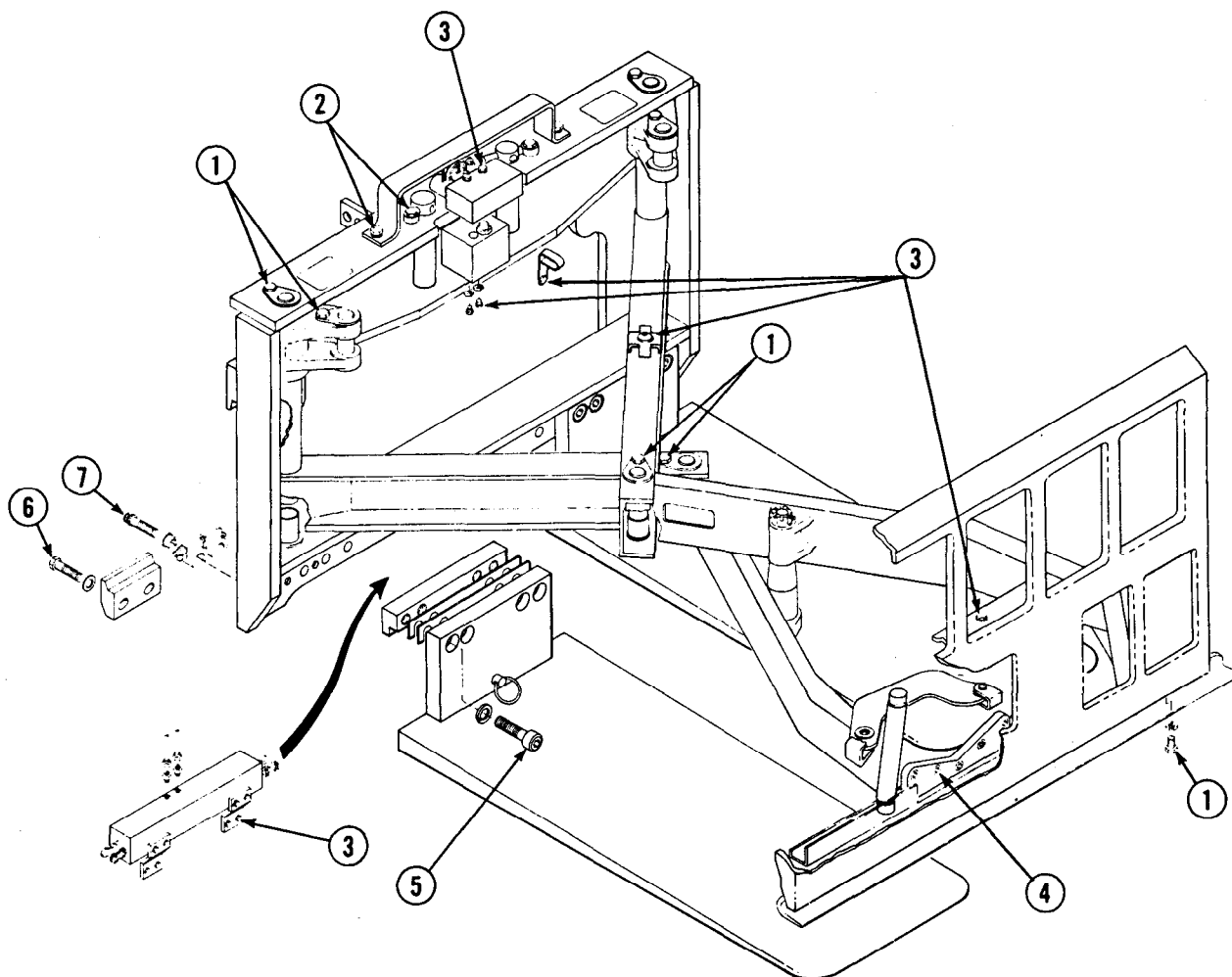
	Mounting	Dimension A—ITA (ISO)	
		Minimum	Maximum
	Class II	14.94 in. (380.0mm)	15.00 in. (381.0 mm)
	Class III	18.68 in. (474.5mm)	18.74 in. (476.0mm)

2659x

Section 6 Specifications

6.1-3 Torque Values

Note that all specifications are shown in US and (Metric) units where applicable.



Not Shown

All cylinder piston nuts - See Sections 5.5-7, 8, 9, 10.

All cylinder retainers - See Sections 5.4-7, 8, 9, 10.

Valve fittings and cartridges - 10-15 ft.-lbs. (13-19 N·m).

Additional equipment for SHEET SAV® - See Section 5.8-1.

Ref. No.	Fastener Thread Size	Torque Values	
		Ft.-Lbs.	(N·m)
1	3/8 NC	14-16	(19-22)
2	1/2 NC	35-39	(47-53)
3	5/16 NC	7-9	(10-12)
4	1/2 NC	45-50	(60-70)
5	3/4 NC	200-210	(270-285)
6	5/8 NC	105-115	(140-155)
7	5/8 NC	60-70	(80-95)

Do you have questions you need answered right now? Call your nearest Cascade Service Department.

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